

New species and records of *Anacroneuria* (Klapálek) from Venezuela

(Insecta, Plecoptera, Perlidae)

By Bill P. Stark

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A minimum of 31 species of the genus *Anacroneuria* (Klapálek) are recorded from Venezuela, including 18 described as new species. Eight species are described from Cerro de la Neblina and other remote sites in Territorio Federal Amazonas, 6 are described from Cordillera de Merida or Sierra de Perija, 3 are described from the Maracay area, and one is described from a site in the state of Bolivar. *A. bifasciata* (Pictet) and *A. fenestrata* (Pictet) are redescribed and notes are given for *A. intermixta* (Walker) and *A. signata* (Walker). Nine additional species represented by unassociated females are described under informal designations. A few unassociated and associated nymphs are also described.

Dr. Bill P. Stark, Mississippi College, Dept. of Biological Sciences, Box 4045, Clinton, Mississippi, 39058, USA.

Introduction

Anacroneuria is a widespread and diverse neotropical stonefly genus with over 130 nominal but poorly known species. 23 species have been described from the northern Andes of Colombia and Venezuela but types are available for only 15 of these and most are known from single type specimens (Stark unpublished, Benedetto unpublished). Two species, *A. intermixta* (Walker) and *A. signata* (Walker), both known from female types, were described from Venezuela, otherwise the “known” *Anacroneuria* fauna of Venezuela consists of *A. bifasciata* (Pictet) (Zwick 1972, 1973), *A. schmidti* (Enderlein) (Jewett 1959), and *A. iridescens* Klapalek (Klapalek 1922). The latter two species records should not be considered valid until the specimens can be located and reexamined.

Presently, no *Anacroneuria* have been identified from the isolated table top mountains along the Venezuelan-Brazilian border. This study is based largely on 1984-1985 collections made on the expedition to the Cerro de la Neblina National Park, under the direction of the Fundacion para el Desarrollo de las Ciencias Fisicas, Matematicas y Naturales of Venezuela, and the Smithsonian Institution. Collections from this locality have already produced a number of previously undescribed species in several insect orders, including four species in the relatively rare stonefly genera, *Enderleina* and *Macrogynoplax* (Stark 1989, Stark & Zwick 1989).

Specimens from other Venezuelan localities were obtained from the Smithsonian or from the Departamento de Zoologia Agricola, U.C.V., Maracay, Venezuela, through O. S. Flint, Jr. of the Smithsonian. The Venezuelan samples were carefully compared with a large series of *Anacroneuria* from Bolivia, Colombia, Costa Rica, and localities throughout the Neotropics. Study of this material suggests minimal overlap of Venezuelan species with those known from Colombia, and no overlap with Costa Rica and other Neotropical regions. A recently described species from Colombia (Rojas and Baena 1993) does not appear to be closely related to any of the species included in this study. The Venezuelan material represents 31 species including 18 which are described as new. Holotypes are deposited in the National Museum of Natural History (USNM) and paratypes in the Mississippi Entomological Muse-

um, Mississippi State University (MEM) and the Departamento de Zoología Agrícola, U.C.V., Maracay, Venezuela (DZAM). Material has been also compared from The Natural History Museum, London (BMNH), Museum für Naturkunde, Berlin (MNHB), Naturhistorisches Museum, Wien (NHMW), and Zoologische Staatssammlung, München (ZSM). The following key should permit separation of males of known Venezuelan *Anacroneuria*.

Provisional key to Venezuelan male *Anacroneuria*

1. Wings banded in amber and dark brown (Fig. 131) *A. bifasciata* (Pictet)
- Wings variable, but without bands 2.
2. Forewing length greater than 13.5 mm 3.
- Forewing length less than 13 mm 9.
3. Hammer low, scarcely elevated above sternum (Fig. 85) *A. chorrera*, spec. nov.
- Hammer length equal to apical diameter 4.
4. Hammer apex quadrate (Fig. 97); aedeagal hooks with foot-like apices (Fig. 98)
..... *A. cuadrada*, spec. nov.
- Hammer apex circular; aedeagal hooks without foot-like apices 5.
5. Dorsal aspect of aedeagus with a transverse subapical arcuate lobe (Fig. 55)
..... *A. arcuata*, spec. nov.
- Aedeagus without a dorsal arcuate lobe 6.
6. Hammer tiny (Fig. 118); aedeagal apex notched (Fig. 119) *A. muesa*, spec. nov.
- Hammer thimble-shaped (Fig. 28); aedeagal apex rounded 7.
7. Aedeagal apex strongly trilobed (Fig. 137); pale mesal pronotal stripe not extending laterally
beyond ocelli (Fig. 135) *A. fenestrata* (Pictet)
- Aedeagal apex simple (Figs 30, 124); pale mesal pronotal stripe extending laterally beyond ocelli
(Fig. 26) 8.
8. Aedeagal apex abruptly narrowed (Fig. 30) *A. shamatari*, spec. nov.
- Aedeagal apex gradually tapered (Fig. 126) *A. paleta*, spec. nov.
9. Aedeagal apex simple (Figs 60, 65) 10.
- Aedeagal apex multilobed (Fig. 21) 16.
10. Aedeagal hooks straight, dagger-like (Fig. 91) *A. cruza*, spec. nov.
- Aedeagal hooks curved, scythe-like (Figs 6, 105) 11.
11. Apex of aedeagal hooks finger-like, apex of aedeagus surmounting a distinct neck (Fig. 105)
..... *A. digitata*, spec. nov.
- Apex of aedeagal hooks normal; subapical area of aedeagus without neck (Figs 6, 109) 12.
12. Ventral aspect of aedeagus with a pair of large membranous lobes (Fig. 59)
..... *A. baniva*, spec. nov.
- Ventral membranous aedeagal lobes small or absent 13.
13. Aedeagal apex gradually narrowed to a point (Figs 65, 67) *A. bari*, spec. nov.
- Aedeagal apex truncate or broadly rounded (Figs 6, 109) 14.
14. Apices of aedeagal hooks falcate (Fig. 79); ventral aspect of aedeagus with a small membranous
lobe (Fig. 80) *A. chiquita*, spec. nov.
- Apices of aedeagal hooks gradually tapered; ventral aedeagal aspect without membranous lobe
..... 15.

15. Projecting apical process of aedeagus subequal to shoulder (Fig. 109) *A. llana*, spec. nov.
 – Projecting apical process of aedeagus about 2 × as long as shoulder (Fig. 6)
 *A. blanca*, spec. nov.
16. Aedeagal apex with a dorsolateral pair of small horn-like processes (Fig. 72)
 *A. caraca*, spec. nov.
 – Aedeagal apex without horn-like processes 17.
17. Ventral aspect of aedeagus with a large membranous lobe (Fig. 16) *A. pequena*, spec. nov.
 – Ventral aspect of aedeagus without membranous lobe 18.
18. Lateral lobes of aedeagal apex scarcely projecting (Fig. 114) *A. menuda*, spec. nov.
 – Lateral lobes of aedeagal apex distinctly projecting (Figs 42, 154) 19.
19. Lateral lobes of aedeagal apex about as wide as median lobe (Figs 21, 42) 20.
 – Lateral lobes of aedeagal apex about half as wide as median lobe (Fig. 154) *A. sp.* VZ-10
20. Wings with a large clear spot beyond cord, and an irregular clear costal stripe before cord (Fig. 41)
 *A. vistosa*, spec. nov.
 – Wings rather uniformly pigmented *A. pinza*, spec. nov.

***Anacroneuria blanca*, spec. nov.**

Figs 1-11, 45

Types. Holotype ♂, 2♂♂ and 3♀♀ paratypes from Venezuela, Territorio Federal Amazonas, Cerro de la Neblina, Basecamp, 140 m, 21-29 February 1984, D. Davis, T. McCabe (USNM). Additional paratypes, all from Cerro de la Neblina: Basecamp, 140 m, 1-10 March 1984, D. Davis, T. McCabe, 2♂♂, 3♀♀ (USNM). Same location, 24 November-1 December 1984, R. L. Brown, 1♂, 1♀ (MEM). Same location, 4-12 February 1984, D. Davis, T. McCabe, 4♂♂, 2♀♀ (USNM, DZAM). Same location, 20-24 March 1984, O. Flint, J. Louton, 2♂♂, 3♀♀, 7 nymphs (USNM). Same location, 13-15 March 1984, O. Flint, J. Louton, 2♂♂ (USNM). Same location, 5 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 2♂♂, 2♀♀ (USNM). Same location except Rio Baria, 12 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♂, 1♀ (USNM). Same location, 27 January 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♀, 6 nymphs (USNM). Same location, 21-28 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 4♂♂, 10♀♀ (USNM, DZAM). Same location except Aqua Blanca, 160 m, 20-21 March 1984, O. Flint, J. Louton, 2♂♂ (USNM).

Description

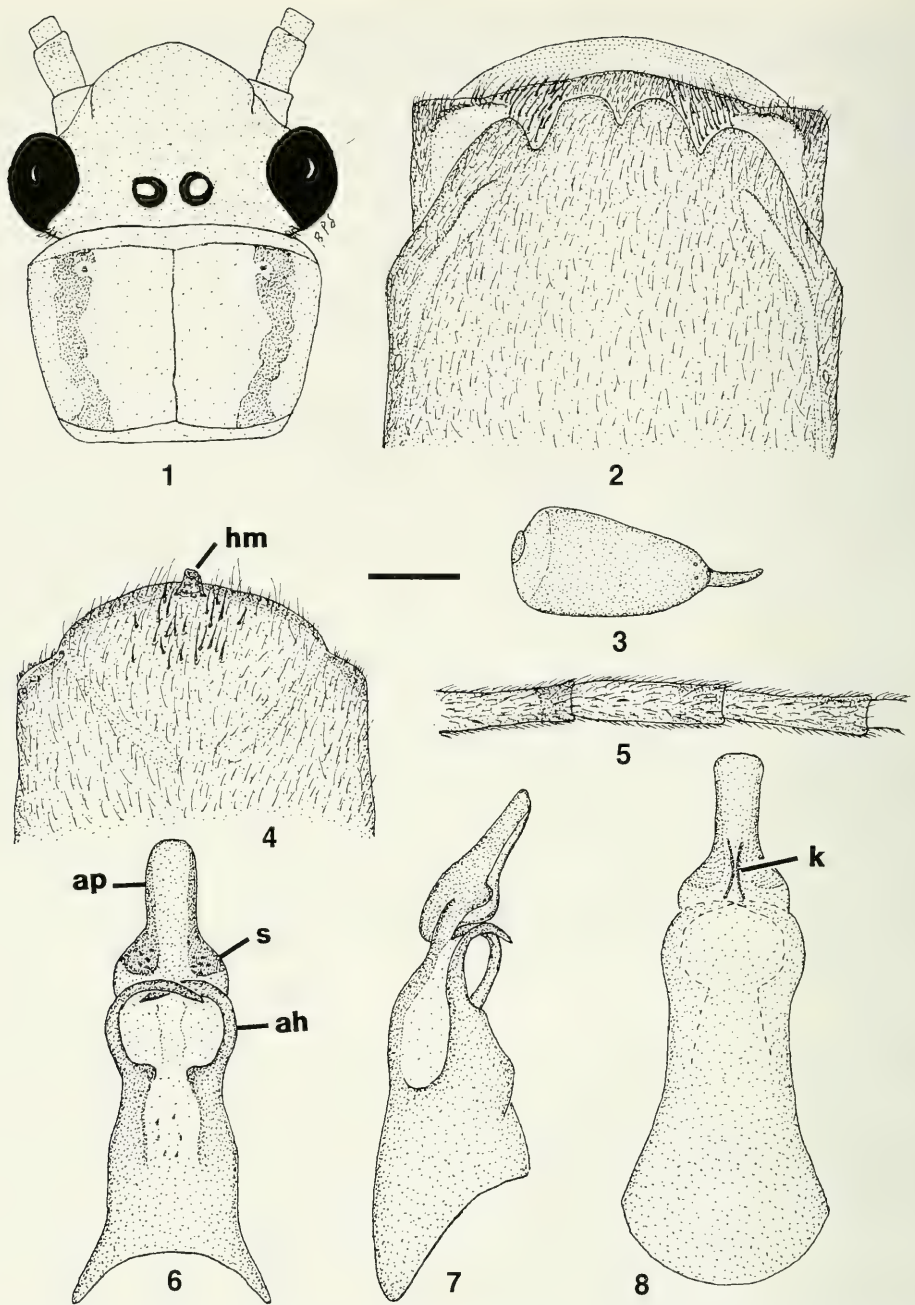
Adult color pattern. Head yellow, pronotum with a pair of dark, parenthesis-like, mid-lateral stripes bordering a broad median yellow area (Fig. 1). Wing membrane and veins pale, with an obscure pale spot beyond the cord. Apical antennal and cercal segments banded (Fig. 5).

Male. Forewing length 10-12 mm. Hammer longer than apical diameter; area surrounding hammer with scattered long bristles which form an irregular brush (Fig. 4). Aedeagus scoop-like and slender apically (Figs 6-8); dorsal aspect with a short, low, median keel (Fig. 8).

Female. Forewing length 13-14 mm. Subgenital plate with 4 subequal lobes; lateral notches deeper than median notch. Posterior margin of sternum 9 with a narrow sclerotized band and a pair of low, lateral, anteapical humps. Median field of sternum 9 covered with a patch of red-brown setae; setae in center of field short, longer setae clustered around edges. Posterior membrane of sternum 9 bearing a dense band of microtrichia (Fig. 2).

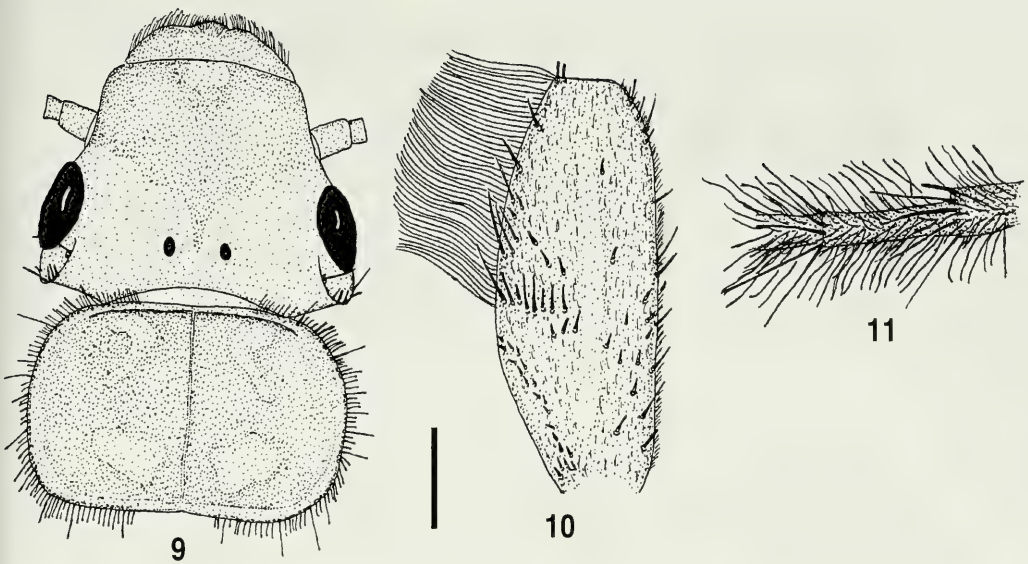
Egg. Length 0.45 mm, width 0.19 mm. Spindle shaped with a low, button-like collar and a long (0.09 mm) spine on the posterior pole. Chorion smooth; micropyles located around base of spine (Figs 3, 45).

Nymph. Body length 10-12 mm. Anterior half of head brown except for pale anteromesal spot. Pronotum brown with obscure pale spots on disc and along lateral margins (Fig. 9). Fore femur with a linear patch of short bristles extending from the basal area to near the marginal fringe. Transverse bristle row of 7 long bristles near midlength; 10 scattered long bristles beyond row (Fig. 10). Mid and



Figs 1-8. *A. blanca*, spec. nov. 1. Head and pronotum. 2. Female sterna 8 and 9. 3. Egg. 4. Male sternum 9. 5. Apical cercal segments. 6. Aedeagus, ventral. 7. Aedeagus, lateral. 8. Aedeagus, dorsal. Hm=hammer, AP=apical process, S=shoulder, AH=aedeagal hook. Scales: 0.6 mm (1), 0.3 mm (2, 4, 5), 0.15 mm (3, 6, 7, 8).

hind femora without bristle row; hind femora without dorsal setal fringe. Apical 16 cercal segments fringed with long setae (Fig. 11). Posterior membrane of abdominal segment 10 forming a triangular projection between paraproct bases.



Figs 9-11. *A. blanca*, spec. nov. nymphal structures. 9. Head and pronotum. 10. Left fore femur. 11. Apical cercal segments. Scales: 0.6 mm (9), 0.3 mm (10), 0.15 mm (11).

Etymology. The species name *blanca* refers to the pale habitus of the adults of this species, and to the stream site, "Aqua Blanca", where a few of the specimens were collected.

Discussion. Several species with this general color pattern are known throughout the neotropics, but they differ in details of internal male genitalia. The egg of this species is similar to that of *A. shamatari*, a much larger species found above 700 m on Neblina, and *A. fuscicosta* (Enderlein) from Santa Catarina, Brazil (Zwick, 1973). Nymphs were associated by dissecting the female genitalia from a mature specimen.

The type locality is a blackwater stream about 20 m wide with rapids about 0.6-0.9 m deep interspersed between deep silty pools (O. S. Flint, pers. comm.).

***Anacroneuria pequena*, spec. nov.**

Figs 12-18, 46, 49

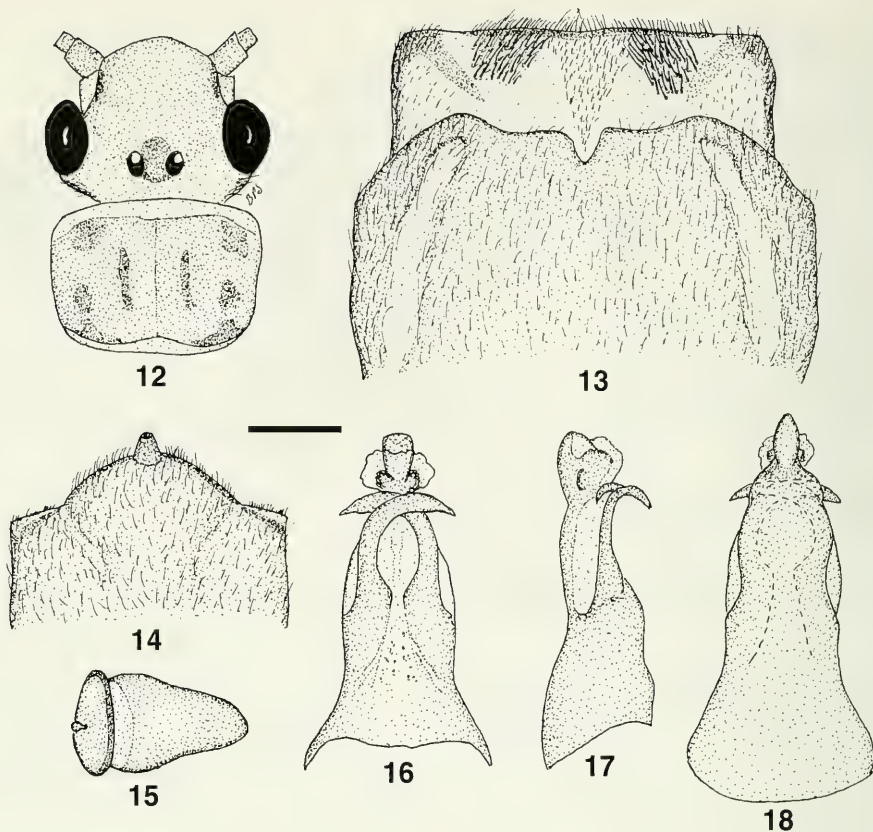
Types. Holotype ♂, 1♂ and 1♀ paratype from Venezuela, Territorio Federal Amazonas, Cerro de la Neblina, Basecamp 140 m, 1-10 March 1984, D. Davis, T. McCabe (USNM). Additional paratypes, all from same locality: 24 November-1 December 1984, R. L. Brown, 1♂, 1♀ (MEM). 20-24 March 1984, O. Flint, J. Louton, 1♂ (USNM). 21-28 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♂, 6♀♀ (USNM, DZAM). 21-29 February 1984, D. Davis, T. McCabe, 1♂, 1♀ (USNM). 26-27 January 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♂, 2♀♀ (USNM). 19 March 1984, O. Flint, J. Louton, 4♂♂, 1♀ (USNM, DZAM). 10-20 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♂ (USNM).

Description

Adult color pattern. Head yellow-brown with darker area over ocelli and lappets. Pronotum brown with obscure darker markings (Fig. 12). Antennae and maxillary palpi brown, labial palpi pale. Basal cercal segments pale, mesal and apical segments brown. Wings and veins brown except for pale costal area.

Male. Forewing length 7.5-8.5 mm. Hammer cone shaped, apex flat (Fig. 14). Apical area of aedeagus with a small digitate mesal process extending from scalloped basal wings; apex covered on ventral surface by a flattened membranous structure. Hooks somewhat chelate (Figs 16-18, 49).

Female. Forewing length 9.5-11.5 mm. Subgenital plate with a shallow mesal notch; lobes wide,



Figs 12-18. *A. pequena*, spec. nov. 12. Head and pronotum. 13. Female sterna 8 and 9. 14. Male sternum 9. 15. Egg. 16. Aedeagus, ventral. 17. Aedeagus, lateral. 18. Aedeagus, dorsal. Scales: 0.6 mm (12), 0.3 mm (13, 14), 0.15 mm (15-18).

posteriorly emarginate. Posterior margin of sternum 9 with a narrow sclerotized band. Short lateral bars present. Mesal field of sternum 9 with a trilobed setal patch; lateral setae long and thick, mesal setae short and thin (Fig. 13).

Egg. Length 0.3 mm, width 0.19 mm. Spindle shaped, chorion smooth. Anchor brown and beret-like, with a bulbous mesal structure (Figs 15, 46).

Nymph. Unknown.

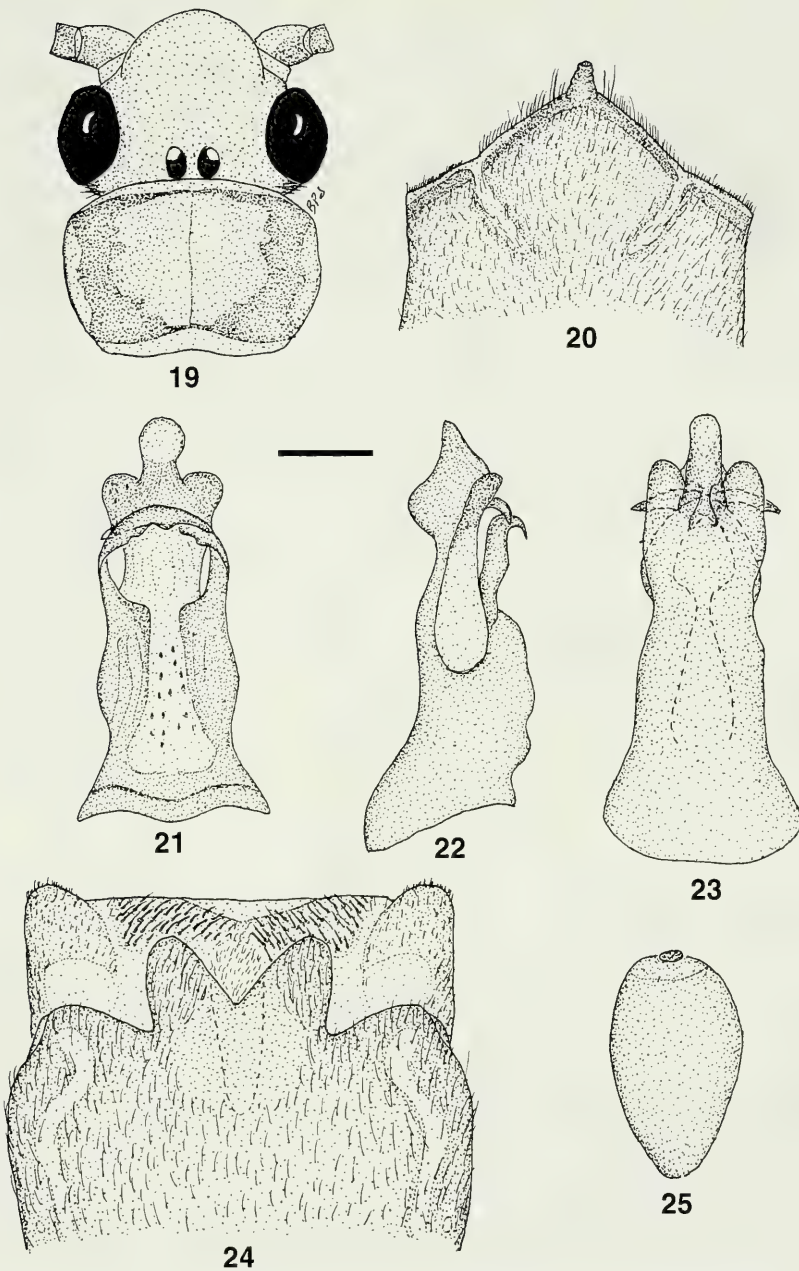
Etymology. *Pequena* means small in the Spanish language.

Discussion. The Basecamp locality is described above under *A. blanca*.

Anacroneuria pinza, spec. nov.

Figs 19-25

Types. Holotype ♂ and 9♀♀ paratypes from Venezuela, Territorio Federal Amazonas, Cerro de la Neblina, Camp IV, 760 m, 15-18 March 1984, O. Flint (USNM, DZAM). Additional paratypes, all from Cerro de la Neblina, Basecamp, 140 m. 19 March 1984, O. Flint, J. Louton, 1♂ (USNM). 20 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♂ (USNM). 5 December 1984, R. L. Brown, 2♂♂ (MEM). 24 November-1 December 1984, R. L. Brown, 2♂♂ (MEM). 21-29 February 1984, D. Davis, T. McCabe, 1♂ (USNM). 28 January 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♀ (USNM).

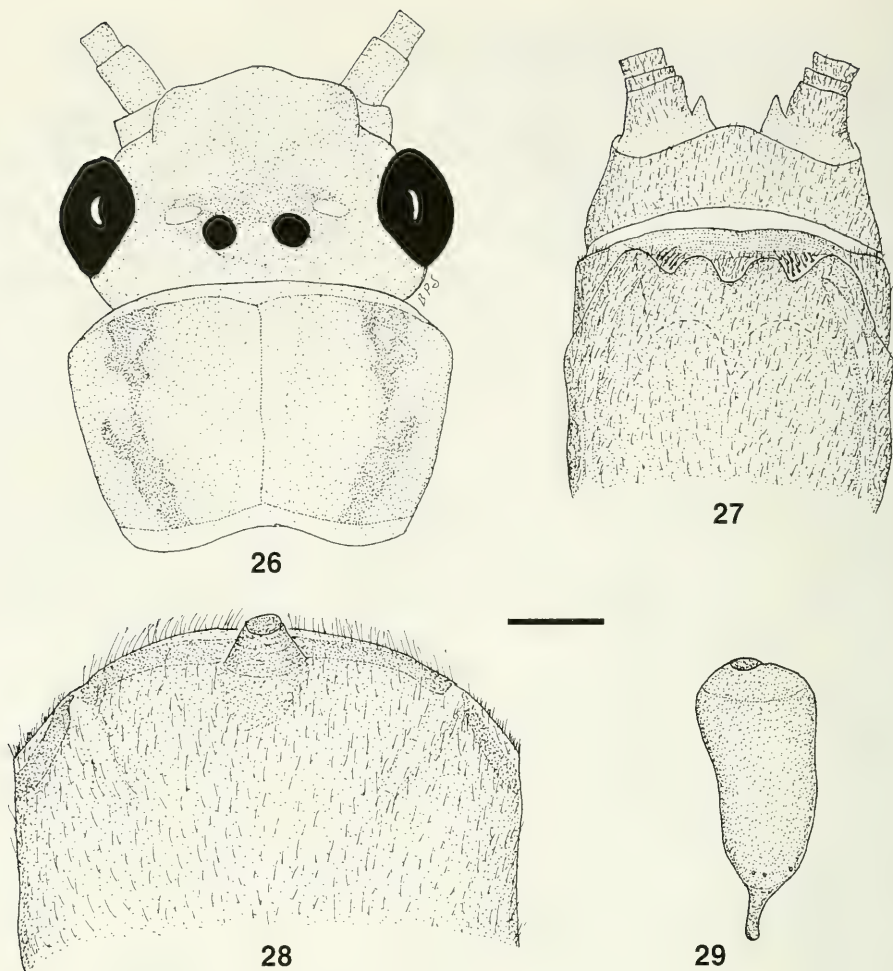


Figs 19-25. *A. pinza*, spec. nov. 19. Head and pronotum. 20. Male sternum 9. 21. Aedeagus, ventral. 22. Aedeagus, lateral. 23. Aedeagus, dorsal. 24. Female sterna 8 and 9. 25. Egg. Scales: 0.6 mm (19), 0.3 mm (20, 24), 0.15 mm (21-23, 25).

Description

Adult color pattern. Head yellow, pronotal disc yellow but surrounded by dark brown pigment (Fig. 19). Wing membrane pale brown, veins brown, R and cord darker.

Male. Forewing length 9.5-10 mm. Hammer twice as long as basal width, strongly narrowed apically (Fig. 20). Aedeagal apex trilobed, lateral lobes short, rounded and projecting laterally (Figs 21-23).



Figs 26-29. *A. shamatari*, spec. nov. 26. Head and pronotum. 27. Female sterna 8 and 9. 28. Male sternum 9. 29. Egg. Scales: 0.6 mm (26, 27), 0.3 mm (28), 0.15 mm (29).

Dorsal aspect with a narrow mesal keel. Hooks chelate with flattened, incised margins forming scoop-like apices (Fig. 21). Base with a distinct subapical ridge on venter (Fig. 21).

Female. Forewing length 12 mm. Mesal lobes of subgenital plate much longer than lateral lobes. Mesal field of sternum 9 weakly sclerotized and covered with a setal patch. Lateral setae long and thick, mesal setae short and thin (Fig. 24).

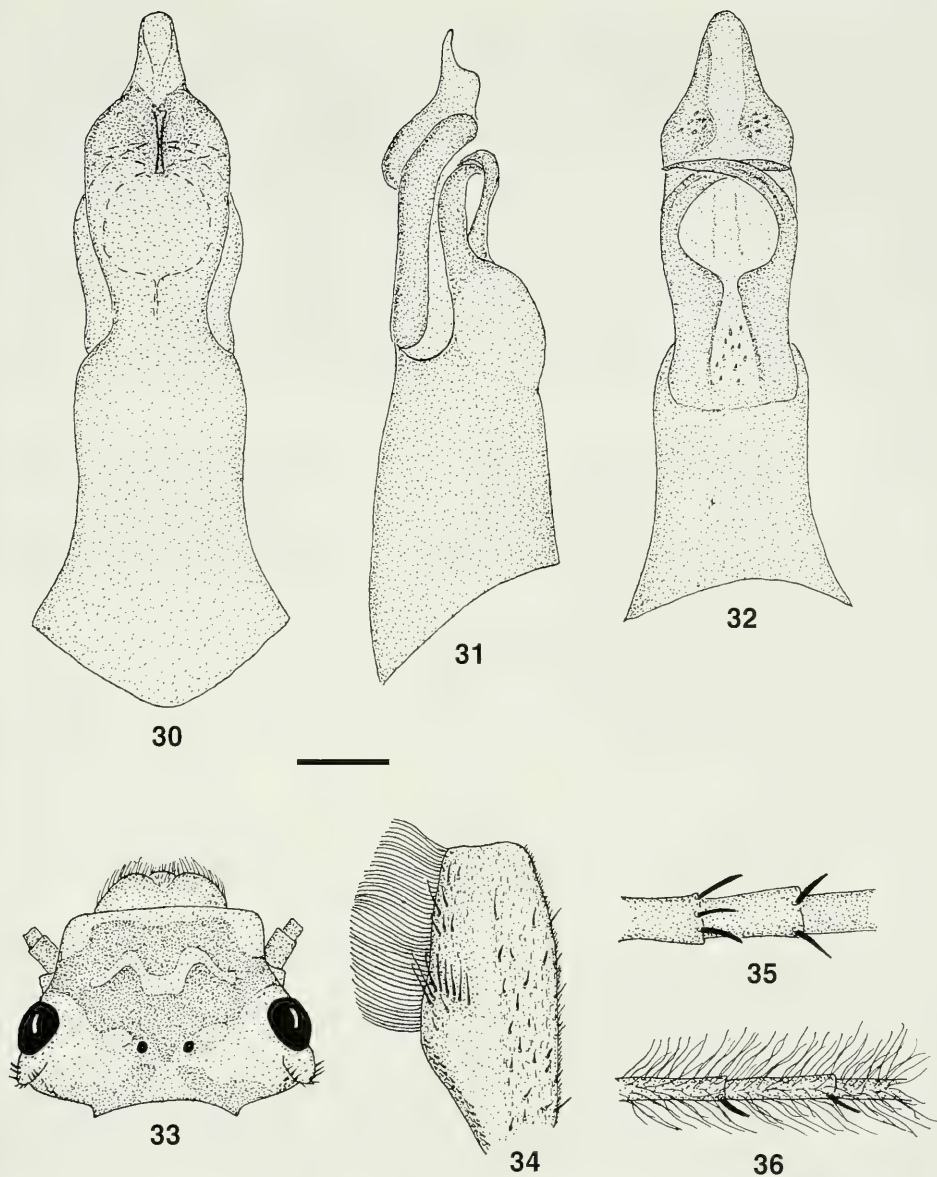
Egg. Length 0.4 mm, width 0.29 mm. Spindle shaped with small button-like collar. Chorion smooth (Fig. 25).

Nymph. Unknown.

Etymology. The species name, *pinza*, refers to the claw-like hooks on the aedeagus.

Discussion. This species is strikingly similar in size, general appearance, and aedeagal structure to *A. vistosa*. The two species are reliably separated by the clear apical spot on the wing of *A. vistosa* and by fine details of the aedeagus. The lateral lobes of the aedeagal apex are shorter in *A. pinza*, and the hooks and dorsal keel also differ. The female subgenital plate and egg readily distinguish these species.

The type locality, Camp IV, is upstream of the Basecamp site. At this site the stream is about 15 m wide and the substrate includes boulders and bedrock (O. S. Flint, pers. comm.).



Figs 30-36. *A. shamatari*, spec. nov. 30. Aedeagus, dorsal. 31. Aedeagus, lateral. 32. Aedeagus, ventral. 33. Nymphal head. 34. Nymphal fore femur. 35. Mesal nymphal cercal segments. 36. Apical nymphal cercal segments. Scales: 1.2 mm (33), 0.6 mm (34), 0.3 mm (35, 36), 0.15 mm (30-32).

Anacroneuria shamatari, spec. nov.

Figs 26-36, 50

Types. Holotype ♂ and 13 ♀ paratypes from Venezuela, Territorio Federal Amazonas, Cerro de la Neblina, Camp IV, 760 m, 15-18 March 1984, O. S. Flint (USNM, DZAM). Additional paratypes, all from Cerro de la Neblina: Camp VII, 1800 m, 30 January-10 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 3 ♂♂, 7 nymphs (USNM). Same location, 30 January-10 February 1985, A. L. Gardner, A. Conover, 5 ♂♂, 3 ♀♀ (USNM, DZAM). Same location, 2-4 December 1984, R. L. Brown, 2 ♂♂, 9 ♀♀ (MEM). Camp II, 2100 m, 29 January 1985, W. Steiner, 1 ♂ (USNM). Same location, 16-18 March 1984, J. Louton, 1 ♂, 1 ♀ (USNM).

Description

Adult color pattern. Head yellow with obscure brown area forward of ocelli. Pronotum with a pair of narrow, dark mid-lateral stripes bordering a broad median yellow area (Fig. 26). Wing membrane pale brown, veins, including costa, pale brown. Antennae and cerci brown.

Male. Forewing length 17.5-19 mm. Hammer broad basally, length subequal to apical diameter (Fig. 28). Ventral aedeagal apex broadly triangular, hooks with a low anteapical keel (Figs 32, 50); dorsal aspect with a broad low keel (Figs 30-31). Basal section cylindrical, offset on venter by a suture (Fig. 32).

Female. Forewing length 22-24 mm. Subgenital plate with 4 subequal lobes; median notch slightly deeper than lateral notches. Posterior margin of sternum 9 without sclerotized bar. Median field of sternum 9 covered with a patch of brown setae; lateral setae thicker and longer than mesal setae. Posterior membrane of sternum 9 bearing a dense band of microtrichia (Fig. 27).

Egg. Length 0.45 mm, width 0.22 mm. Spindle shaped with a low button-like collar and a long (0.08 mm), blunt spine on the posterior pole. Chorion smooth; micropyles located at base of spine (Fig. 29).

Nymph. Body length 16-19 mm. Head forward of ocelli brown except for narrow pale M-line, anterolateral corners, and mesal spot along labrum (Fig. 33). Pronotum brown except for narrow pale stripe along mesal suture. Fore femur with a patch of short thick bristles extending along the dorsal margin from the trochanter to mid-femoral length; a transverse row of 7 long bristles present at mid-length, but absent on mid and hind femora; 12 long bristles scattered on dorsal half of fore femur beyond bristle row (Fig. 34). Apical 9-10 cercal segments bear whorls of long silky hairs which form a fringe along the entire segment (Fig. 36).

Eymology. This species is named for the Shamatari people whose homeland included the rainforest east of Neblina.

Discussion. Nymphs were associated by dissecting eggs from mature individuals. Camp VII and Camp II where many of the paratypes were collected are on top of the tepui in a wet morass characterized by blackwater streams (O. S. Flint, pers. comm.). Camp IV, the type locality, is described above under *A. pinza*.

Anacroneuria vistosa, spec. nov.

Figs 37-44, 47, 51

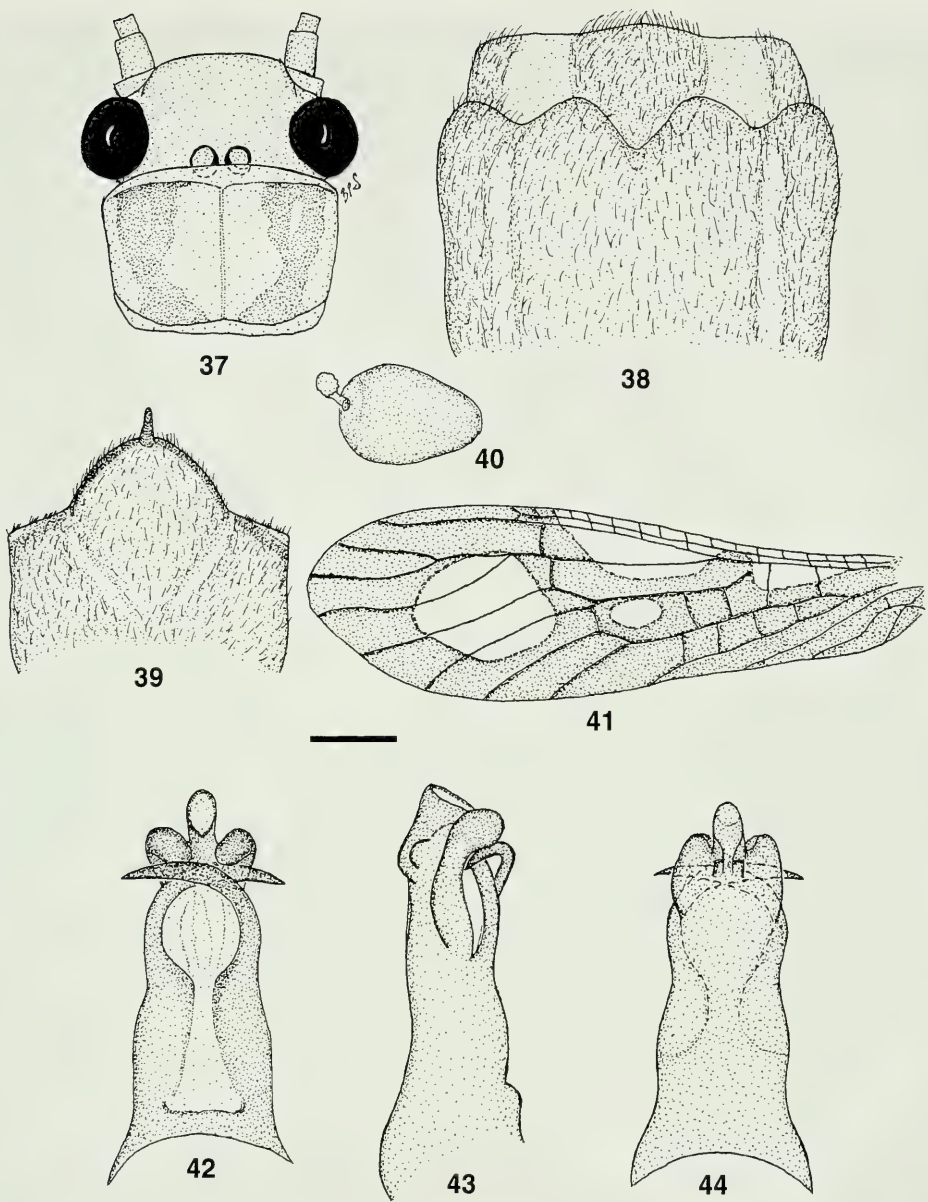
Types. Holotype ♂ and 1♀ paratype from Venezuela, Territorio Federal Amazonas, Cerro de la Neblina, Base-camp, 140 m, 11 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner (USNM). Additional paratypes all from same locality: 4-12 February 1984, D. Davis, T. McCabe, 4♂♂, 9♀♀ (USNM, DZAM). 1-10 March 1984, D. Davis, T. McCabe, 3♂♂ (USNM). 13-20 February 1984, D. Davis, T. McCabe, 3♀♀ (USNM). 21-29 February 1984, D. Davis, T. McCabe, 4♂ (USNM). 14 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 2♂♂ (USNM). 26-31 January 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 3♂♂ (USNM). 5 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 4♂♂, 2♀♀ (USNM). 20 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 1♂ (USNM). 10 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 4♂♂, 2♀♀ (USNM). 21-28 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 5♂♂, 2♀♀ (USNM). 10-20 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 5♂♂, 3♀♀ (USNM, DZAM). 1-9 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 2♀♀ (USNM). 7 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 2♂♂, 1♀ (USNM). 3 February 1985, W. Steiner, 3♂♂ (USNM). 20-24 March 1984, O. Flint, J. Louton, 10♂♂, 2♀♀ (USNM). 24 November-1 December 1984, R. Brown, 2♂♂, 3♀♀ (MEM). 5 December 1984, R. Brown, 2♂♂, 5♀♀ (MEM).

Description

Adult color pattern. Head yellow, pronotum with dark mid-lateral stripes and a broad median yellow area (Fig. 37). Wings amber with wide pale band along costal margin which extends posteriorly over R and Rs, and pale spots on either side of cord (Fig. 41).

Male. Forewing length 8.5-9.5 mm. Hammer long and slender (Fig. 40). Ventral aspect of aedeagus trilobed; lateral lobes finger-like and curved (Figs 42, 51). Dorsal aspect with a pair of small sclerotized lobes on base of median process (Figs 43-44).

Female. Forewing length 12.5-13.5 mm. Subgenital plate with 4 subequal lobes; median notch



Figs 37-44. *A. vistosa*, spec. nov. 37. Head and pronotum. 38. Female sterna 8 and 9. 39. Male sternum 9. 40. Egg. 41. Left front wing. 42. Aedeagus, ventral. 43. Aedeagus, lateral. 44. Aedeagus, dorsal. Scales: 1.2 mm (41), 0.6 mm (37), 0.3 mm (38, 39), 0.15 mm (40, 42-44).

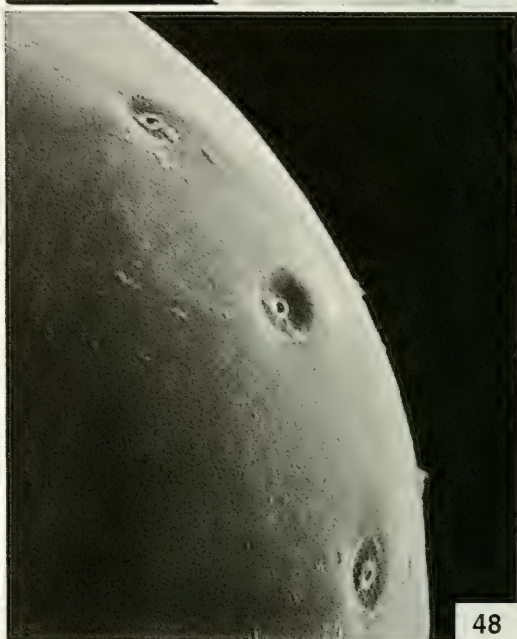
deeper than lateral notches. Sternum 9 weakly sclerotized in median field; sclerite covered with short thin setae (Fig. 38).

Egg. Length 0.25 mm, width 0.19 mm. Spindle shaped with small button-like collar and stalked, mushroom-like anchor. Chorion smooth, micropyles located on posterior pole (Figs 39, 47).

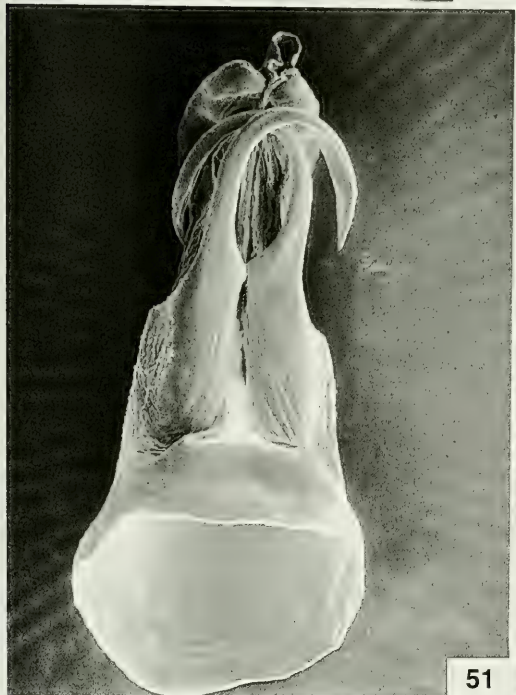
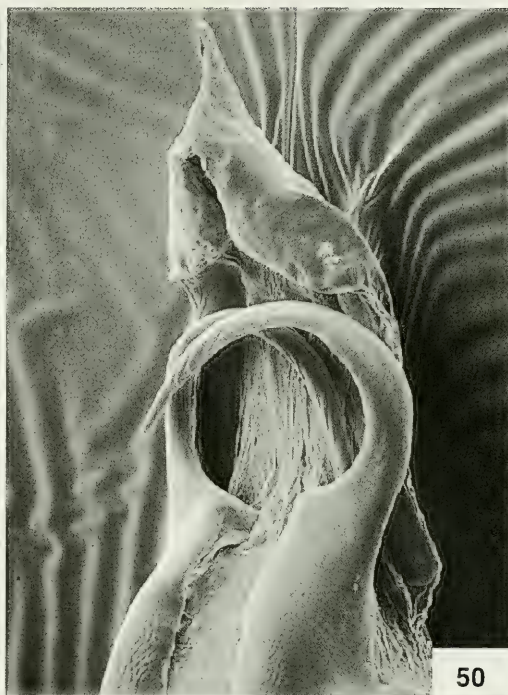
Nymph. Unknown.

Etymology. The species name, *vistosa*, refers to the distinctive and showy color pattern on the wings.

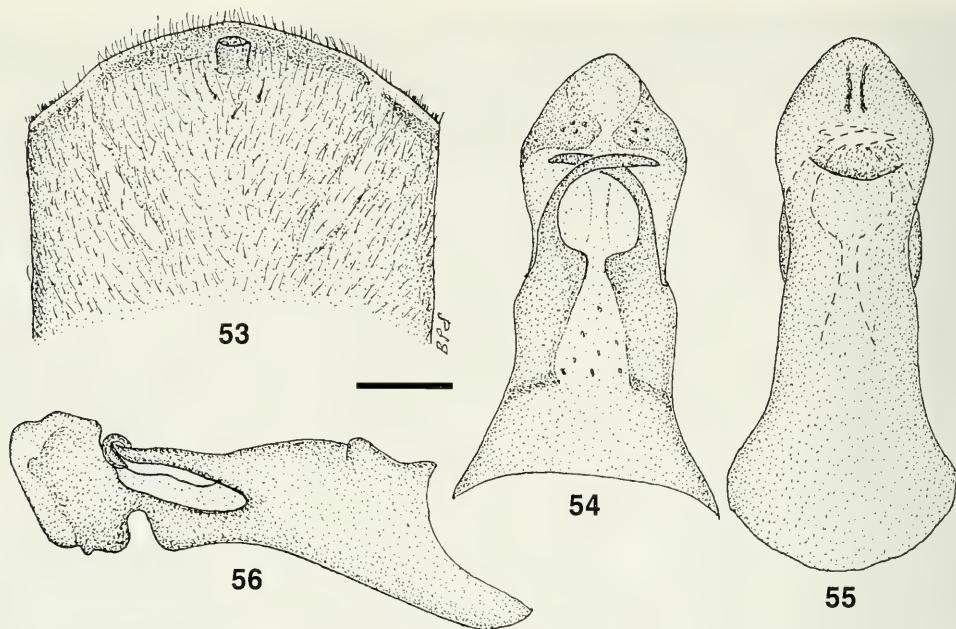
Discussion. The Basecamp locality is described above under *A. blanca*.



Figs 45-48. Scanning electron micrographs of *Anacroneturia* eggs. 45. *A. blanca*, spec. nov., 200 \times . 46. *A. pequena*, spec. nov., 720 \times . 47. *A. vistosa*, spec. nov., 950 \times . 48. *A. chorrera*, spec. nov., 2000 \times .



Figs 49-52. Scanning electron micrographs of *Anacroneuria* aedeagi. 49. *A. pequena*, spec. nov., 500 \times . 50. *A. shamatari*, spec. nov., 170 \times . 51. *A. vistosa*, spec. nov., 110 \times . 52. *A. bifasciata* (Pictet), 200 \times .



Figs 53-56. *A. arcuata*, spec. nov. 53. Male sternum 9. 54. Aedeagus, ventral. 55. Aedeagus, dorsal. 56. Aedeagus, lateral. Scales: 0.3 mm (53), 0.15 mm (54-56).

Anacroneuria arcuata, spec. nov.

Figs 53-56

Types. Holotype ♂ from Venezuela, Aragua, Dos Riitos, 6 km N Rancho Grande, 4 February 1976, C. M. Flint, O. S. Flint (USNM). Paratype: Venezuela, Aragua, Rancho Grande, 1100 m, E. Aragua, 1 May 1951, F. Fernandez Yepez, 1♂ (DZAM).

Description

Adult color pattern. Obscured by specimen condition. Head apparently yellow, pronotum apparently with a wide pale mesal stripe. Wing membrane pale; C, Sc and R pale, Cu, cord, and part of Rs brown.

Male. Forewing length 14 mm. Hammer cylindrical but somewhat compressed (Fig. 53). Aedeagal apex broadly triangular; dorsal aspect with an arcuate, basally directed mesal lobe and a subapical keel. Hooks slender (Figs 54-56).

Female. Unknown.

Egg. Unknown.

Nymph. Unknown.

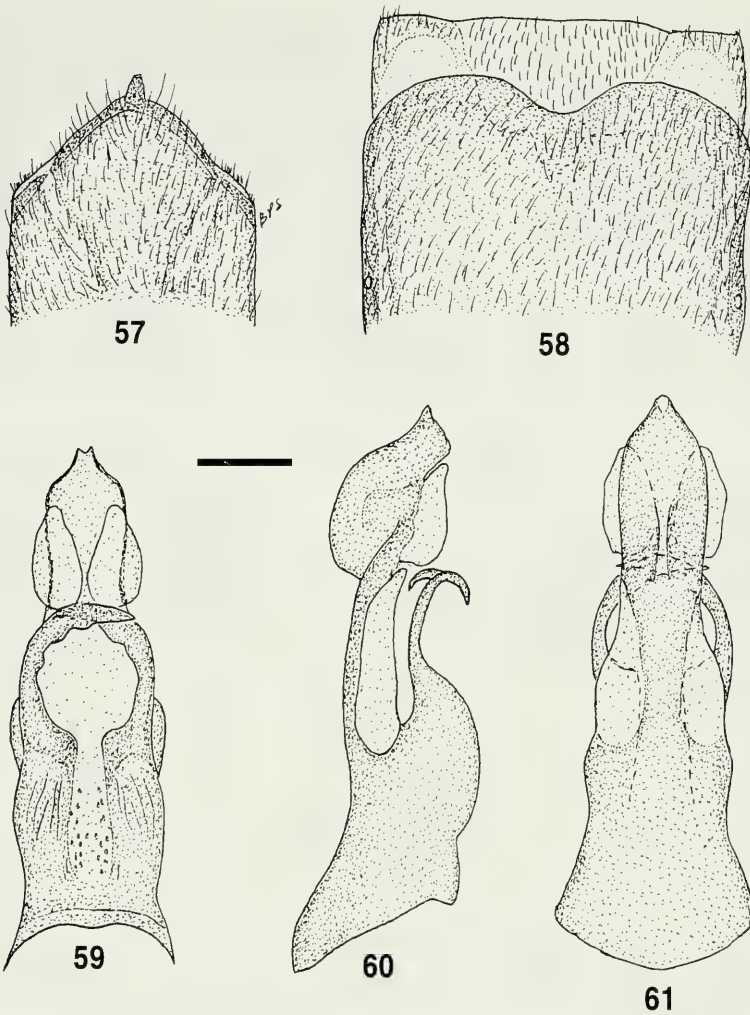
Etymology. The species name, *arcuata*, is based on the shape of the dorsal aedeagal lobe.

Discussion. The type locality includes a pair of small cascading rills in high elevation cloud forest (O. S. Flint, pers. comm.).

Anacroneuria baniva, spec. nov.

Figs 57-61

Types. Holotype ♂ and 2♀♀ paratypes (pinned) from Venezuela, Territorio Federal Amazonas, Rio Cataniapo, 10 km S Puerto Ayacucho, 9 March 1984, O. S. Flint (USNM, DZAM).



Figs 57-61. *A. baniva*, spec. nov. 57. Male sternum 9. 58. Female sternum 8 and 9. 59. Aedeagus, ventral. 60. Aedeagus, lateral. 61. Aedeagus, dorsal. Scales: 0.3 mm (57-58), 0.15 mm (59-61).

Description

Adult color pattern. Head yellow, pronotal pattern obscure. Wing membrane pale, veins brown except C, Sc and R, which are pale.

Male. Forewing length 7.5 mm. Hammer somewhat conical (Fig. 57). Ventral aspect of aedeagal apex bearing a pair of large membranous lobes; apex notched; inner margins of hooks irregularly incised (Figs 59-60). Dorsal aspect with a low median keel (Fig. 61).

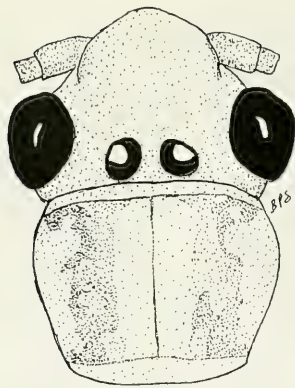
Female. Forewing length 8.5 mm. Subgenital plate broadly bilobed, notch shallow. Posterior margin of sternum 9 without sclerotized band; mesal field covered with a sparse patch of fine setae (Fig. 58).

Egg. Unknown.

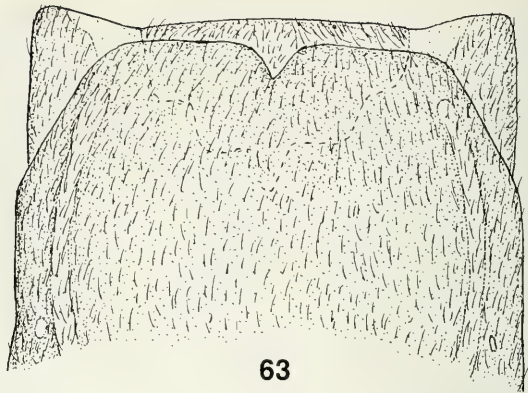
Nymph. Unknown.

Etymology. This species is named for the Baniva people of the upper Orinoco region of southwest Venezuela.

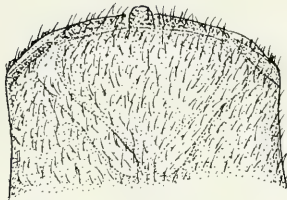
Discussion. Rio Cataniapo is a large clearwater stream with abundant submerged vegetation in silty pools (O. S. Flint, pers. comm.).



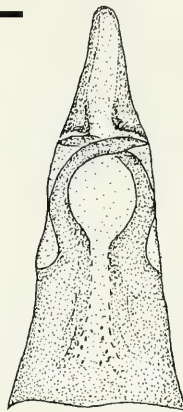
62



63



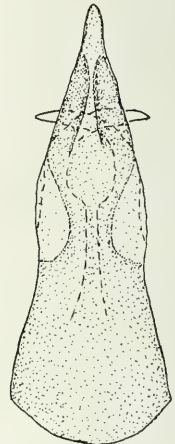
64



65



66



67

Figs 62-67. *A. bari*, spec. nov. 62. Head and pronotum. 63. Female sterna 8 and 9. 64. Male sternum 9. 65. Aedeagus, ventral. 66. Aedeagus, lateral. 67. Aedeagus, dorsal. Scales: 0.6 mm (62), 0.3 mm (63, 64), 0.15 mm (65-67).

Anacroneuria bari, spec. nov.

Figs 62-67

Types. Holotype ♂ from Venezuela, Zulia, El Tucuco, 45 km SW Machiques, 5-6 June 1976, A. S. Menke, D. Vincent (USNM). Paratypes, all from Venezuela: Barinas, Barinitas, 22-23 February 1969, P. J. Spangler, P. M. Spangler, 3♂♂, 3♀♀ (USNM, DZAM). Miranda, Aqua Blanca, P. N. Guatopo, 7 February 1976, C. M. Flint, O. S. Flint, 1♂ (USNM).

Description

Adult color pattern. Head yellow, pronotum with dark mid-lateral stripes and a median pale stripe (Fig. 62). Wing membrane pale brown, veins darker except for costal area.

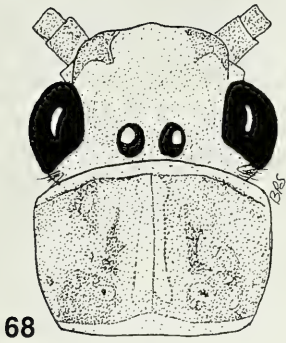
Male. Forewing length 9 mm. Hammer rounded apically, length subequal to width (Fig. 64). Aedeagal apex gradually narrowed, dorsal aspect with a long keel; hooks slender (Figs 65-67).

Female. Forewing length 12 mm. Subgenital plate lobes truncate with a shallow V-shaped notch. Sternum 9 with a weakly sclerotized posterior band. Mesal field covered with fine setae (Fig. 63).

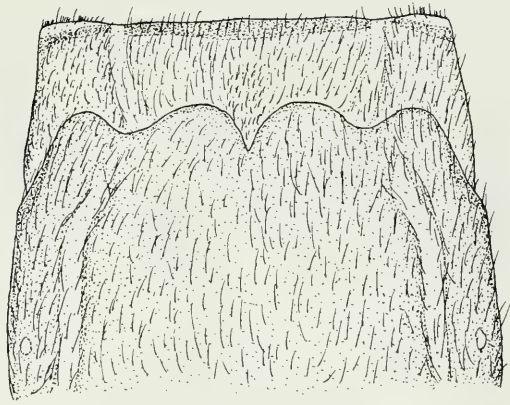
Egg. Unknown.

Nymph. Unknown.

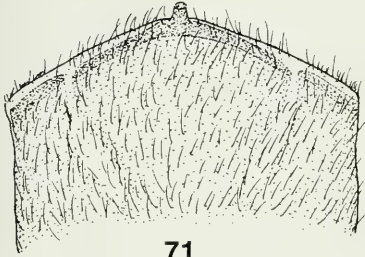
Etymology. This species is named for the Bari people of western Venezuela.



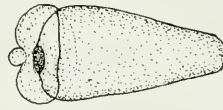
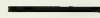
68



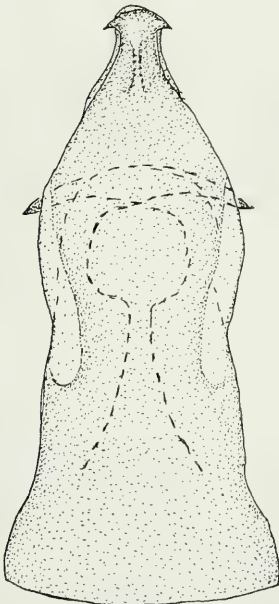
69



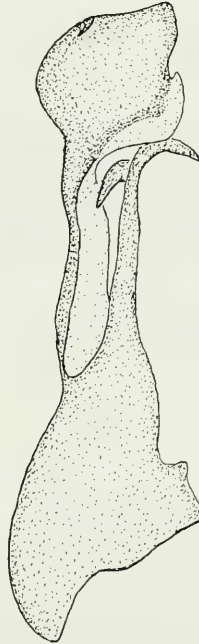
71



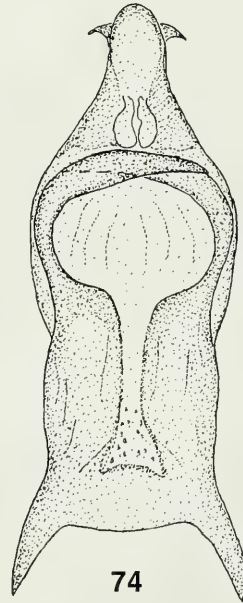
70



72

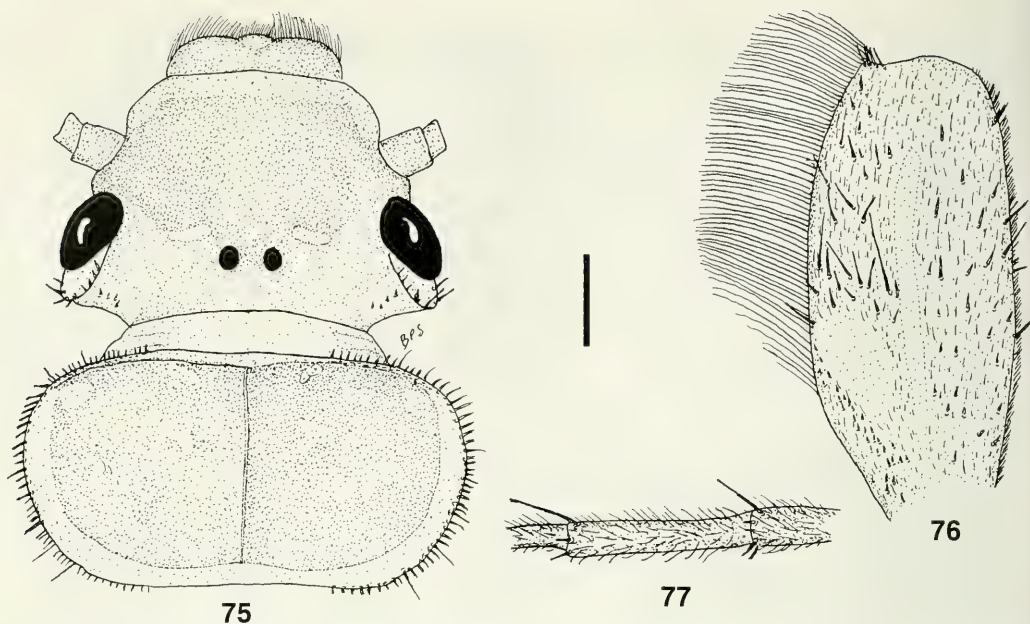


73



74

Figs 68-74. *A. caraca*, spec. nov. 68. Head and pronotum. 69. Female sterna 8 and 9. 70. Egg. 71. Male sternum 9. 72. Aedeagus, dorsal. 73. Aedeagus, lateral. 74. Aedeagus, ventral. Scales: 0.6 mm (68), 0.3 mm (69, 71), 0.15 mm (70, 72-74).



Figs 75-77. *A. caraca*, spec. nov., nymphal structures. 75. Head and pronotum. 76. Left fore femur. 77. Apical cercal segments. Scales: 0.6 mm (75), 0.3 mm (76), 0.15 mm (77).

Anacroneuria caraca, spec. nov.

Figs 68-77

Types. Holotype ♂ from Venezuela, Aragua, P. N. Henri Pittier, nr. El Limon, Rio Limon, 500 m, 10-12 November 1979, H. M. Savage (USNM). Paratypes, all from Venezuela: Aragua, Rio El Limon, Maracay, Fish Hatchery, 3-4 January 1975, F. H. Weibezahn, 5♂♂, 8♀♀ (USNM, DZAM). Same location, 30 January 1975, F. H. Weibezahn, 11♂♂, 10♀♀ (USNM). Same location, 24 January-2 February 1983, O. S. Flint, 2♂♂ (USNM). Same location, 3-6 February 1976, C. M. Flint, O. S. Flint, 7♂♂, 3♀♀ (USNM). Same location, 12-13 February 1975, F. H. Weibezahn, 13♂♂, 15♀♀ (USNM, DZAM). Same location, 7-8 April 1975, F. H. Weibezahn, 12♂♂, 14♀♀ (USNM). Same location, 3-4 June 1975, F. H. Weibezahn, 4♂♂, 11♀♀ (USNM). Same location, 26-28 June 1974, H. B. N. Hynes, 1♂, 5♀♀ (USNM). Same location, 15-16 July 1975, F. H. Weibezahn, 1♂, 2♀♀ (USNM). Same location, 25-26 September 1975, F. H. Weibezahn, 3♂♂, 5♀♀ (USNM). Same location, 22-23 October 1974, F. H. Weibezahn, 1♂, 7♀♀ (USNM). Same location, 18-19 December 1974, F. H. Weibezahn, 4♂♂, 17♀♀ (USNM). Same location, 2-6 February 1976, C. M. Flint, O. S. Flint, 3♂♂, 3♀♀, 11 nymphs, 4 exuvia (USNM). Barinas, Barinitas, 22-23 February 1969, P. J. Spangler, P. M. Spangler, 1♂, 2♀♀ (USNM).

Description

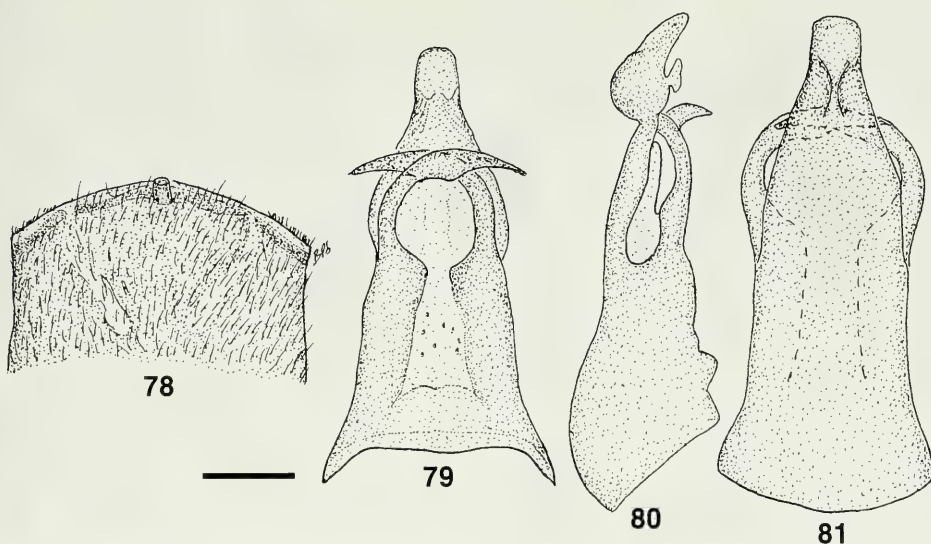
Adult color pattern. Head yellow with dark lappets and an obscure pale brown area forward of ocelli. Pronotum brown with a narrow mesal yellow stripe (Fig. 68). Wing membrane and veins brown except for pale costal area.

Male. Forewing length 9-10 mm. Hammer a slender cylinder about twice as long as diameter (Fig. 71). Aedeagal apex with a pair of small, dorsolateral horns and a narrow dorsal keel (Figs 72-74); hooks wide at mid-length (Fig. 74).

Female. Forewing length 11-12 mm. Subgenital plate with 4 subequal lobes. Posterior margin of sternum 9 with a narrow sclerotized band; median field covered with a sparse setal patch; longer setae laterally, short fine setae mesally (Fig. 69).

Egg. Length 0.32 mm, width 0.17 mm. Spindle shaped with a low button-like collar. Chorion smooth, anchor membranous with a small mesal knob (Fig. 70).

Nymph. Body length 8-11 mm. Head forward of ocelli brown except for pale area at base of labrum. Pronotum brown with scattered pale spots on disc and pale lateral margins (Fig. 75). Fore femur with a linear patch of short bristles extending from base to near the marginal fringe. Transverse bristle row



Figs 78-81. *A. chiquita*, spec. nov. 78. Male sternum 9. 79. Aedeagus, ventral. 80. Aedeagus, lateral. 81. Aedeagus, dorsal. Scales: 0.3 mm (78), 0.15 mm (79-81).

of 5-7 long bristles at mid-length; about 15 stout bristles beyond row (Fig. 76). Apical cercal segments with a sparse fringe of short setae (Fig. 77).

Etymology. This species is named for the Caraca people of Venezuela.

Discussion. Twenty three collections made by F. H. Weibezahn at the Maracay fish hatchery site included 68♂♂ and 168♀♀ specimens. Adults were found in every month, but no males were included in the March, May, August, and November samples. The paratype series above was selected to represent the flight period of this species at Rio El Limon.

Although *A. caraca* may be the only species at the Maracay fish hatchery site, nymphs were positively associated by dissection of male genitalia from one individual. This species is closely related to the Trinidad species, *A. aroucana* Kimmins, but is readily distinguished by the more prominent dorsoapical aedeagal horns and by the bluntly rounded egg apex. Nymphs of the two species may be inseparable (Stark, 1994).

The type locality, a small clear stream with rapid flow, was described by Flint (1981).

***Anacroneuria chiquita*, spec. nov.**

Figs 78-81

Types. Holotype ♂ from Venezuela, Zulia, El Tucuco, 45 km SW Machiques, 5-6 June 1976, A. Menke, D. Vincent (USNM).

Description

Adult color pattern. Head and pronotal pattern obscured by specimen condition. Wing membrane and veins brown except for pale costal area.

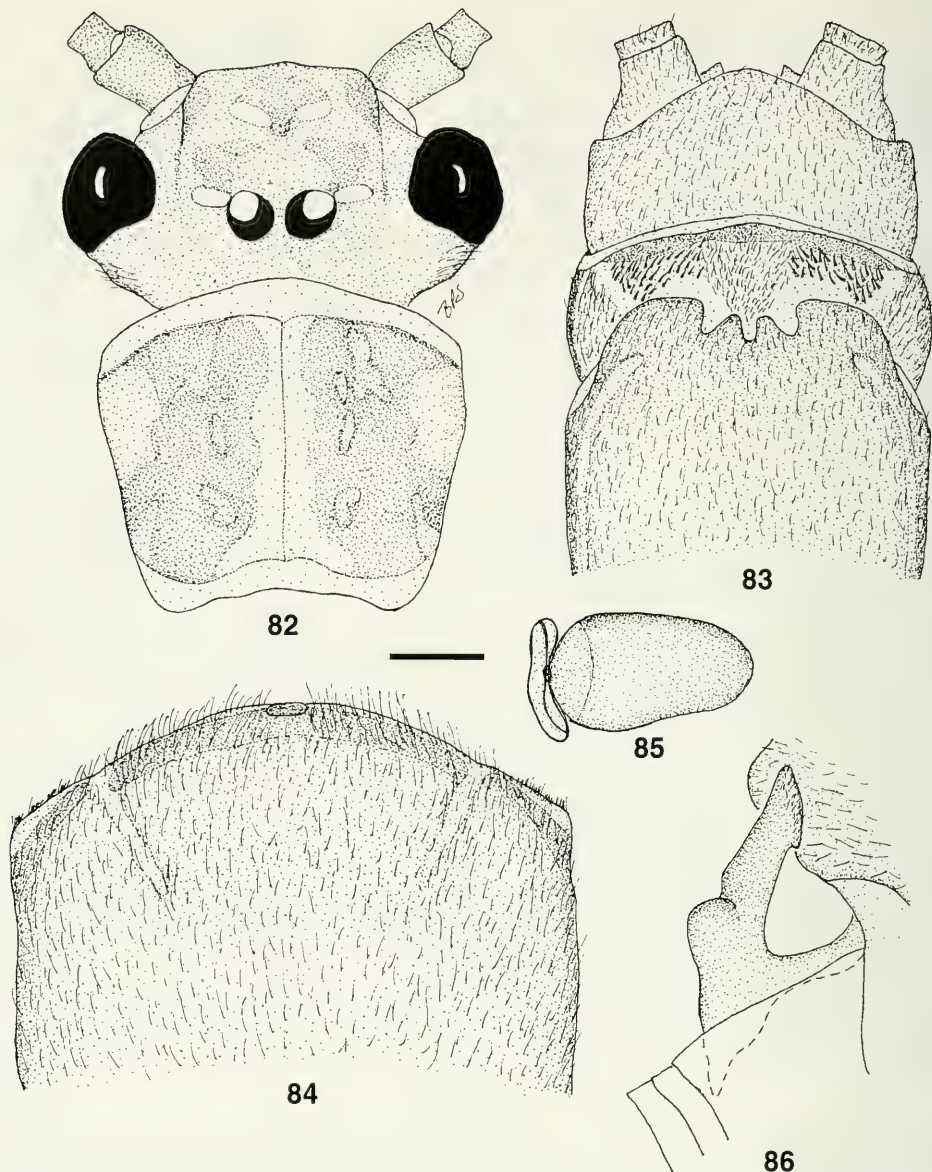
Male. Forewing length 8 mm. Hammer cylindrical, height about 2 × width (Fig. 78). Aedeagal apex simple, slightly constricted subapically, and bearing a small membranous ventral lobe. Dorsomesal keel present; hooks falcate (Figs 79-81).

Female. Unknown.

Egg. Unknown.

Nymph. Unknown.

Etymology. Chiquita is Spanish for small.

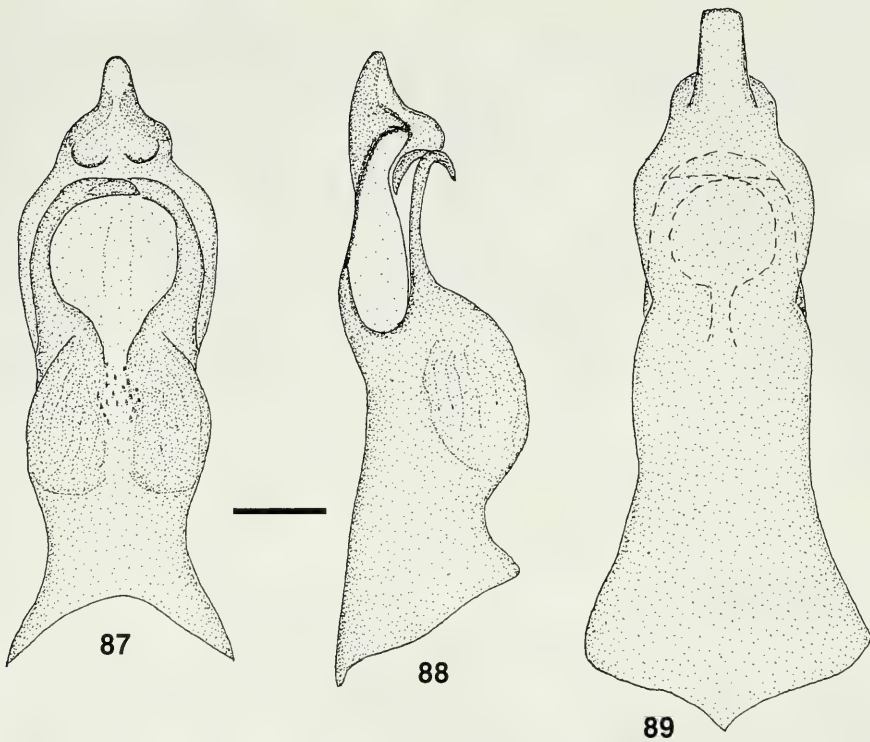


Figs 82-86. *A. chorrera*, spec. nov. 82. Head and pronotum. 83. Female sterna 8 and 9. 84. Male sternum 9. 85. Egg. 86. Male right paraproct, lateral. Scales: 0.6 mm (82, 83), 0.3 mm (84, 86), 0.15 mm (85).

Anacroneuria chorrera, spec. nov.

Figs 48, 82-89

Types. Holotype ♂, 1♂ and 1♀ paratype from Venezuela, Merida, La Chorrera Canyon, 6500 ft., 8 February 1978, J. B. Heppner (USNM). Additional Paratypes all from Venezuela: Merida, 6 km N Merida, 5000 ft, Andean mountain forest, 9 February 1978, J. B. Heppner, 2♂♂ (USNM). Merida, Rio Santo Domingo, 5 km NW Santo Domingo, 19 February 1976, C. M. Flint, O. S. Flint, 3♂♂ (USNM). Merida, Rio Montalban, Rt. 4, 19 km W. Merida, 20 February 1976, C. M. Flint, O. S. Flint, 3♂♂ (USNM, DZAM). Merida, La Pedregosa, Merida, 21 February 1976, C. M. Flint, O. S. Flint, 2♂♂ (USNM). Distrito Federal, Rio Petaquire below Bajo Seco, 25 January 1983, O. S. Flint, 3♂♂ (USNM, DZAM). Aragua, Est. Exp. Cataurito, 1 February 1983, O. S. Flint, 1♂, 1♀ (USNM).



Figs 87-89. *A. chorrera*, spec. nov. 87. Aedeagus, ventral. 88. Aedeagus, lateral. 89. Aedeagus, dorsal. Scale: 0.15 mm.

Description

Adult color pattern. Head pale brown with darker blotches anterolateral to ocelli and in median field near labrum; lappets brown. Pronotum brown with a narrow, pale mesal stripe (Fig. 82). Wing membrane and veins pale brown, Cu and cord darker.

Male. Forewing length 18 mm. Hammer a low, quadrangular callus, about twice as wide as long (Fig. 85). Paraprocts with an enlarged basal callus (Fig. 86). Ventral aedeagal apex narrowly rounded with a pair of small knobs distal to hooks (Fig. 87); dorsal aspect without a mesal keel (Figs 88-89). Basal section with a pair of low membranous mounds basal to hooks (Fig. 87).

Female. Forewing length 25 mm. Subgenital plate with 4 lobes; lateral lobes about twice as wide and slightly longer than mesal lobes. Sternum 9 with a wide sclerotized posterior band. Median field covered with a setal patch; lateral areas with short, thick red setae, mesal area with short fine setae (Fig. 83).

Egg. Length 0.35 mm, width 0.21 mm. Spindle shaped; chorion smooth, anchor beret-like and membranous. Micropyles set in shallow pits located near posterior pole (Figs 48, 84).

Nymph. Unknown.

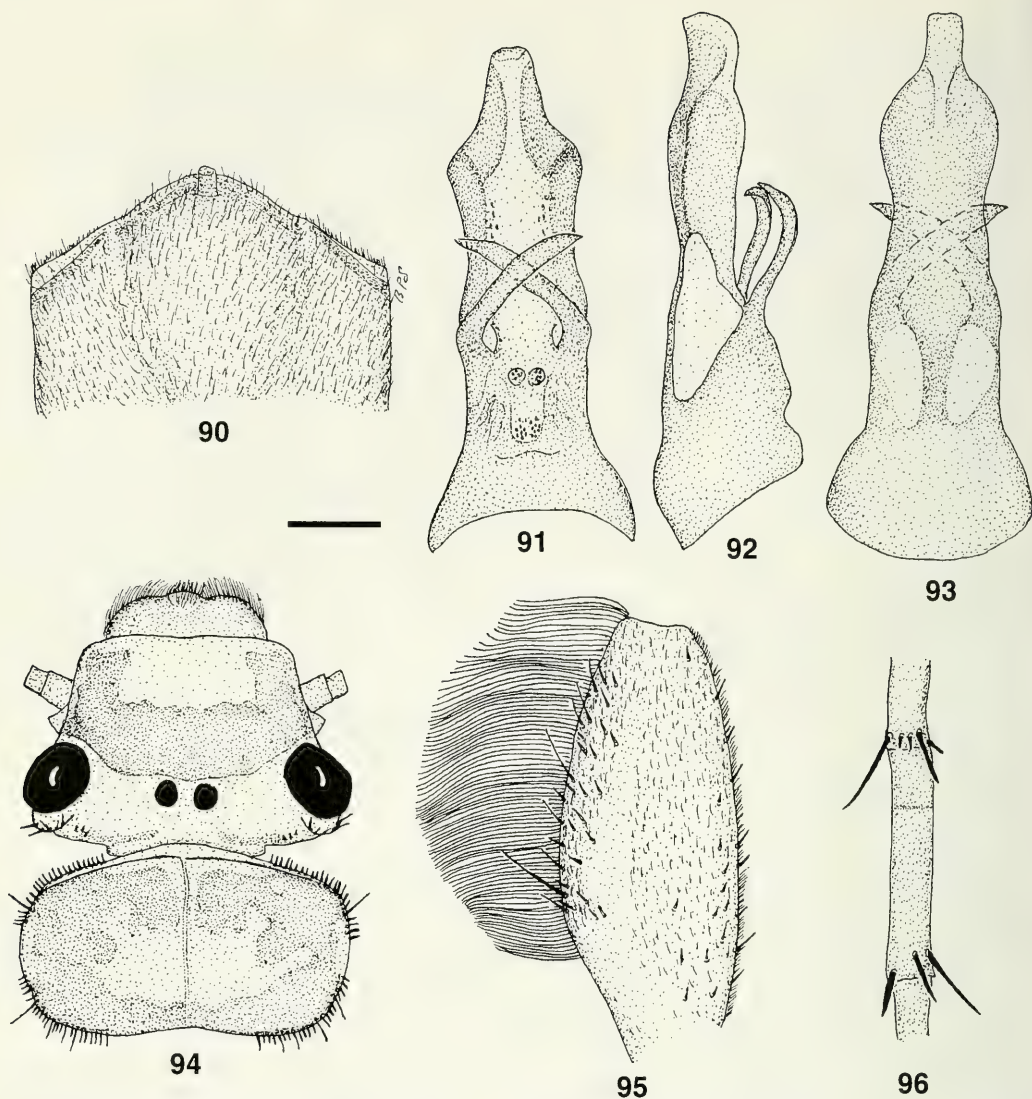
Etymology. Named for the type locality.

Discussion. Many of the paratypes were collected along small, clearwater streams about 1-3 m wide, with gravel-rubble-boulder substrates (O. S. Flint, pers. comm.).

Anacroneuria cruzi, spec. nov.

Figs 90-96

Types. Holotype ♂ from Venezuela, Territorio Federal Amazonas, Exp. Culebra [03 33'N, 65 65'W], N. Duida, 7-16 April 1950, J. Maldonado Capriles (USNM). Paratypes, all from Venezuela: Territorio Federal Amazonas, Cerro de la Neblina, Agua Blanca, 160 m, 20-21 March 1984, O. Flint, J. Louton, 2 nymphs, 2 exuvia (USNM).



Figs 90-96. *A. cruzi*, spec. nov. 90. Male sternum 9. 91. Aedeagus, ventral. 92. Aedeagus, lateral. 93. Aedeagus, dorsal. 94. Nymphal head and pronotum. 95. Nymphal left fore femur. 96. Nymphal apical cercal segments. Scales: 0.6 mm (94), 0.3 mm (90, 95), 0.15 mm (91-93, 96).

Description

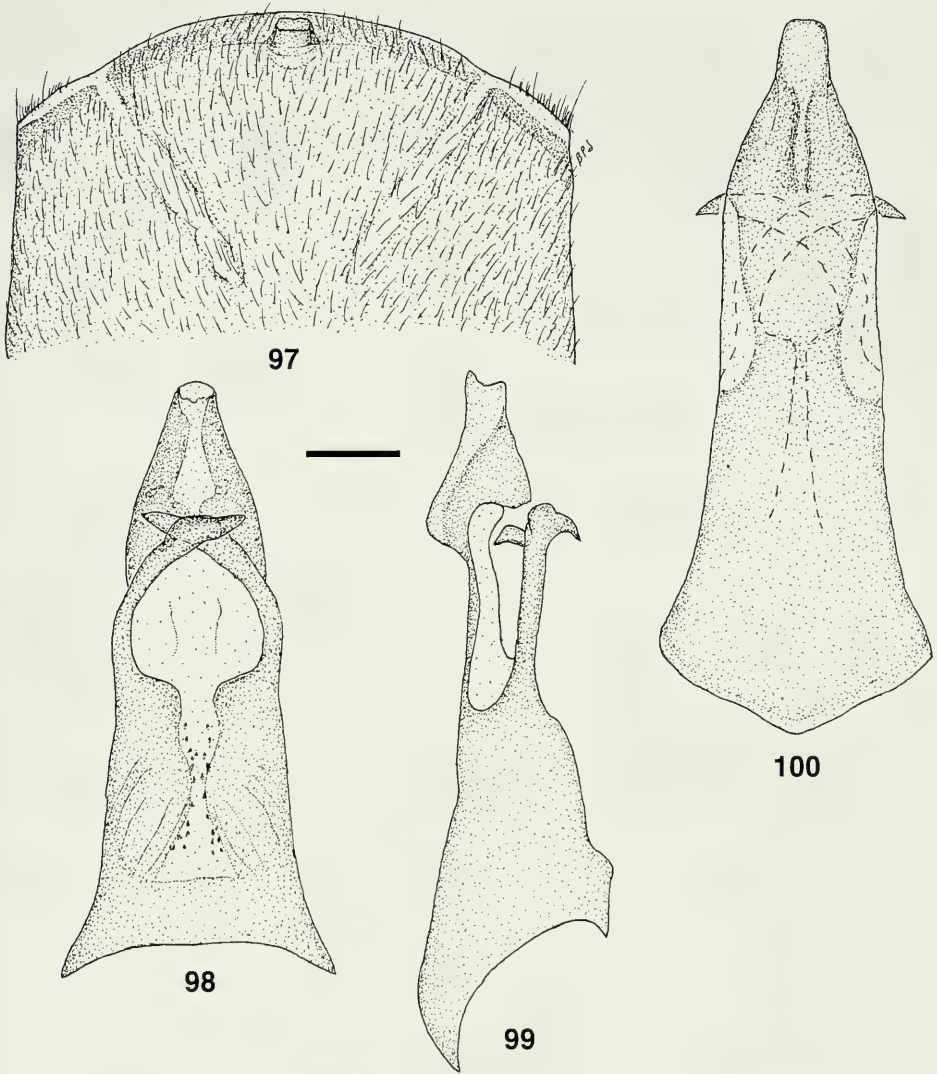
Adult color pattern. Head and pronotal pattern obscure. Head apparently brown, pronotum dark brown with a narrow pale mesal stripe. Wing membrane and veins dark brown.

Male. Forewing length 8 mm. Hammer cylindrical and twice as long as wide (Fig. 90). Aedeagal apex long, slender and strongly sclerotized. Hooks dagger-like, forming a cross pattern. Membranous basal strip short, bearing a small pair of membranous knobs near base of hooks (Figs 91-93).

Female. Unknown.

Egg. Unknown.

Nymph. Body length 10-13 mm. Head with a large brown area forward of ocelli; anteromesal area of brown pigment invaded by a large quadrangular area of yellow pigment. Pronotum brown with mesal areas of pale pigmentation (Fig. 94). Fore femur with 30 scattered anterodorsal bristles of



Figs 97-100. *A. cuadrada*, spec. nov. 97. Male sternum 9. 98. Aedeagus, ventral. 99. Aedeagus, lateral. 100. Aedeagus, dorsal. Scales: 0.3 mm (97), 0.15 mm (98-100).

variable length; basal bristle patch and transverse bristle row absent (Fig. 95). Apical cercal segments bear whorls of bristles; fringe absent (Fig. 96).

Discussion. The nymphs were associated by dissecting the aedeagus from a mature individual.

Anacroneuria cuadrada, spec. nov.

Figs 97-100

Types. Holotype ♂ (pinned) from Venezuela, Merida, Rio Santo Domingo, 5 km NW Santo Domingo, 19 February 1976, C. M. Flint, O. S. Flint (USNM).

Description

Adult color pattern. Head yellow except for dark spot over ocelli. Pronotum with mid-lateral dark brown stripes; pale mesally and on lateral margins.

Male. Forewing length 18 mm. Hammer quadrate, height subequal to apical width (Fig. 97). Aedeagal apex simple; broadly cleft ventrally and with a low dorsomesal keel (Figs 98-100). Hooks expanded to form a foot-like apical section (Fig. 98).

Female. Unknown.

Egg. Unknown.

Nymph. Unknown.

Etymology. Cuadrada, Spanish for square, refers to the quadrate shape of the hammer.

Discussion. Rio Santo Domingo is a small clearwater stream about 3 m wide with gravel-rubble-boulder substrate (O. S. Flint, pers. comm.).

Anacroneuria digitata, spec. nov.

Figs 101-107

Types. Holotype ♂ and 8♀♀ paratypes from Venezuela, Barinas, Rio Santo Domingo, Barinas, 17 February 1976, C. M. Flint, O. S. Flint (USNM, DZAM).

Description

Adult color pattern. Head yellow with an indistinct dark blotch forward of ocelli and on lappets. Pronotum with a narrow pale median stripe (Fig. 101). Wing membrane and veins pale brown.

Male. Forewing length 11.5 mm. Hammer rounded, about twice as long as wide (Fig. 104). Apical section of aedeagus sinuate in lateral aspect (Fig. 106); apex expanded beyond subapical constriction (Figs 105-107); hooks abruptly narrowed forming finger-like apices (Fig. 105).

Female. Forewing length 14.5 mm. Lateral lobes of subgenital plate low, mesal lobes longer and separated by a wide U-shaped notch. Vaginal sclerites visible through cuticle. Posterior margin of sternum 9 with a narrow sclerotized band; median field of sternum 9 with a dense patch of fine, medium length setae (Fig. 102).

Egg. Length 0.3 mm, width 0.16 mm. Spindle shaped with a small button-like collar and a membranous anchor and mesal knob (Fig. 103). Chorion smooth.

Nymph. Unknown.

Etymology. The species name, *digitata*, refers to the finger-like apical section of the aedeagal hooks.

Anacroneuria llana, spec. nov.

Figs 108-111

Types. Holotype ♂ (pinned) from Venezuela, Bolivar, La Escalera, 108 km S Rio Cuyuni, 11-12 February 1976, C. M. Flint, O. S. Flint (USNM).

Description

Adult color pattern. Head and pronotal pattern obscured by specimen condition. Wing membrane pale, veins brown except for C, Sc and R.

Male. Forewing length 10.5 mm. Hammer thimble shaped, flat apically (Fig. 108). Aedeagal apex simple with a narrow, scoop-like area projecting from a broadly rounded subapical region. Dorsomesal keel present; hooks slender (Figs 109-111).

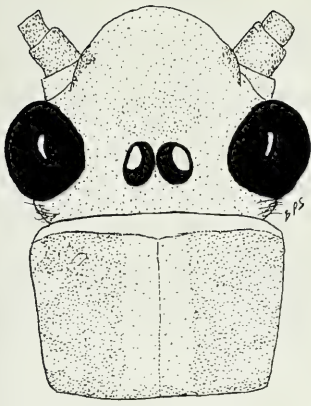
Female. Unknown.

Egg. Unknown.

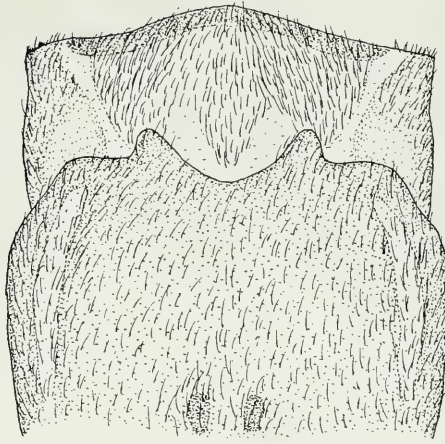
Nymph. Unknown.

Etymology. Llana, Spanish for plain, refers to the non-descript color pattern of this species.

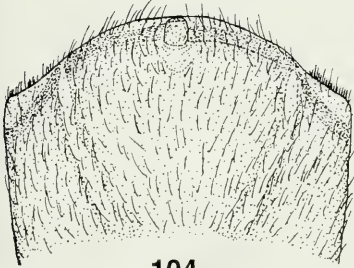
Discussion. La Escalera is a cold, cascading blackwater stream about 5 m wide. At the type locality, the substrate is quite rocky with boulders and rubble over bedrock (O. S. Flint, pers. comm.).



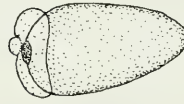
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102



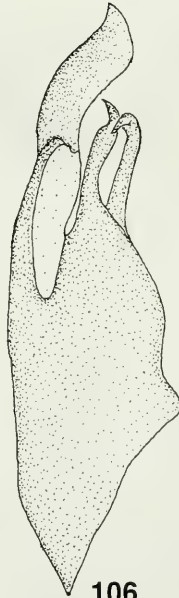
104



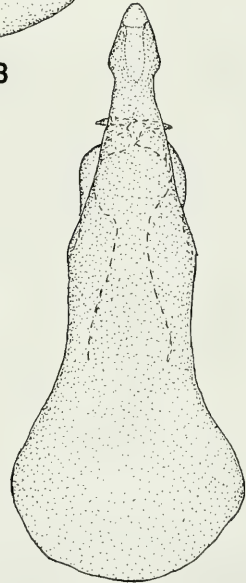
103



105



106



107

Figs 101-107. *A. digitata*, spec. nov. 101. Head and pronotum. 102. Female sterna 8 and 9. 103. Egg. 104. Male sternum 9. 105. Aedeagus, ventral. 106. Aedeagus, lateral. 107. Aedeagus, dorsal. Scales: 0.6 mm (101), 0.3 mm (102, 104), 0.15 mm (103, 105-107).

Anacroneuria menuda, spec. nov.

Figs 112-116

Types. Holotype ♂ from Venezuela, Territorio Federal Amazonas, Rio Aqua Blanca, 29 km S Puerto Ayacucho, 20 February 1986, P. J. Spangler, W. Sanchez (USNM).

Description

Adult color pattern. Head yellow except for dark pigment on lappets and an obscure pale spot over ocelli. Pronotum with irregular mid-lateral dark pigment bands (Fig. 112).

Male. Forewing length 8 mm. Hammer thimble shaped, 2.5 × long as wide (Fig. 113). Aedeagal apex multilobed; ventral aspect appearing trilobed, dorsal aspect with five lobes. Median lobe with a small dorsomesal keel; hooks slender (Figs 114-116).

Female. Unknown.

Egg. Unknown.

Nymph. Unknown.

Etymology. Menuda is Spanish for small.

Anacroneuria muesca, spec. nov.

Figs 117-121

Types. Holotype ♂ from Venezuela, Aragua, Est. Exp. Cataurito, 32 km E Villa de Cura, 28 January 1983, O. S. Flint (USNM).

Description

Adult color pattern. Head patterned with a pale brown band across ocelli, and a pale brown area forward of M-line. Lappets dark; pronotum with a pale median band, dark laterally (Fig. 117). Wing membrane and veins brown.

Male. Forewing length 16 mm. Hammer slender, 2 × as long as wide (Fig. 118). Aedeagal apex simple, consisting of a slender notched process projecting beyond a swollen subapical section. Median dorsal keel absent; hooks slender (Figs 119-121).

Female. Unknown.

Egg. Unknown.

Nymph. Unknown.

Etymology. Muesca, Spanish for notched, refers to the aedeagal apex.

Discussion. The type locality is a small stream with numerous bedrock chutes and plunge basins (O. S. Flint, pers. comm.).

Anacroneuria paleta, spec. nov.

Figs 122-126

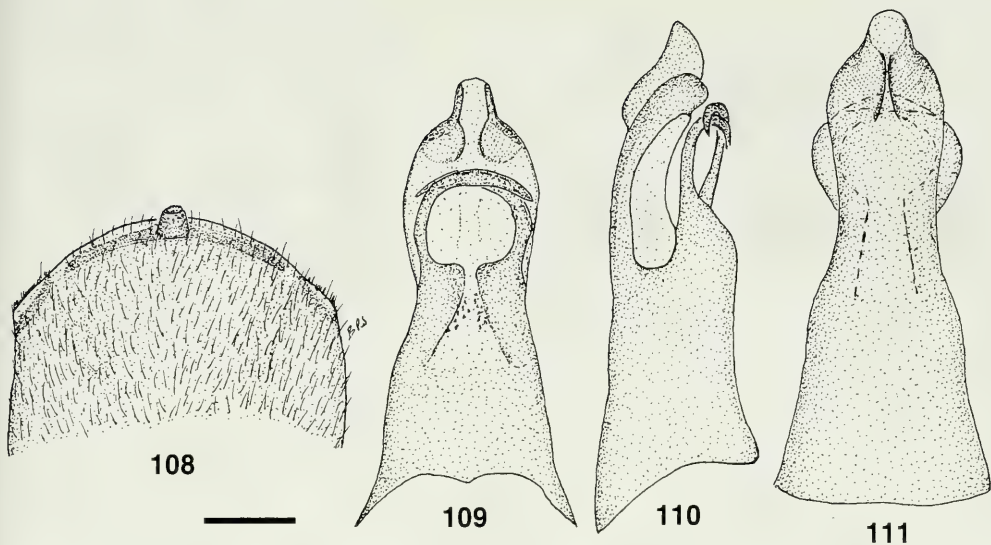
Types. Holotype ♂ from Venezuela, Merida, 4 km S Santo Domingo, 19-23 February 1976, C. M. Flint, O. S. Flint (USNM). Paratypes, all from Venezuela: Barinas, 22 km N Barinitas, 24 February 1976, C. M. Flint, O. S. Flint, 1♂ (USNM). Merida, Rio Montalban, Rt. 4, 19 km W Merida, 20 February 1976, C. M. Flint, O. S. Flint, 4♂♂ (USNM, DZAM). Merida, La Pedregosa, Merida, 21 February 1976, C. M. Flint, O. S. Flint, 1♂ (USNM).

Description

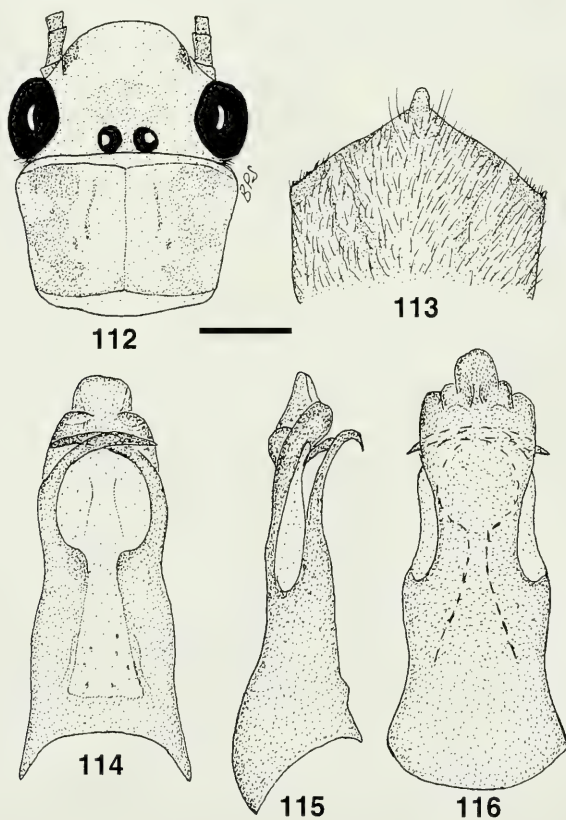
Adult color pattern. Head yellow except for lappets. Pronotum with dark brown mid-lateral stripes and a broad median pale stripe (Fig. 122). Wing membrane and veins brown, costal area pale.

Male. Forewing length 14-15 mm. Hammer thimble-like and twice as long as apical diameter; apex flat (Fig. 123). Aedeagal apex scoop-like, with a pair of partially sclerotized ventral processes and a low dorsal keel; hooks slender (Figs 124-126).

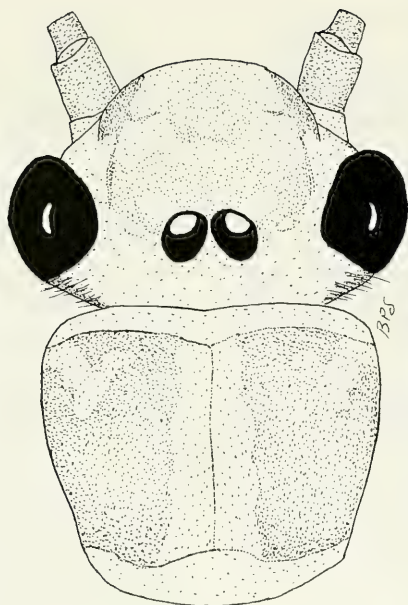
Female. Unknown.



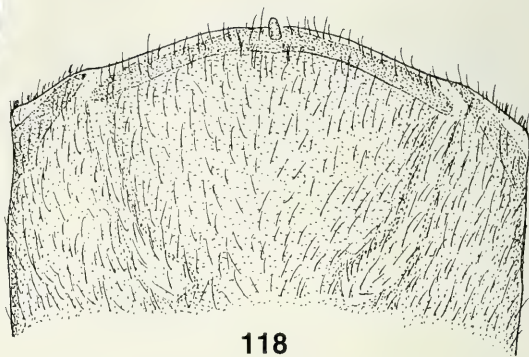
Figs 108-111. *A. ilana*, spec. nov. 108. Male sternum 9. 109. Aedeagus, ventral. 110. Aedeagus, lateral. 111. Aedeagus, dorsal. Scales: 0.3 mm (108), 0.15 mm (109-111).



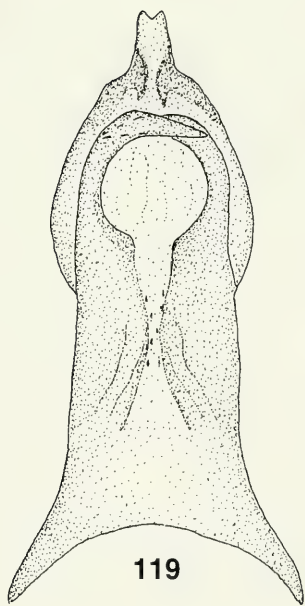
Figs 112-116. *A. menuda*, spec. nov. 112. Head and pronotum. 113. Male sternum 9. 114. Aedeagus, ventral. 115. Aedeagus, lateral. 116. Aedeagus, dorsal. Scales: 0.6 mm (112), 0.3 mm (113), 0.15 mm (114-116).



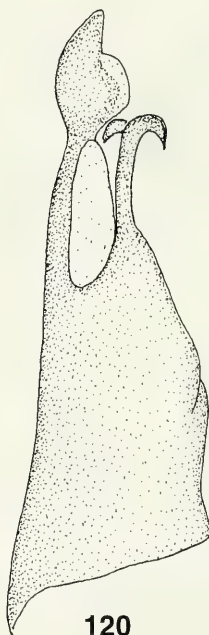
117



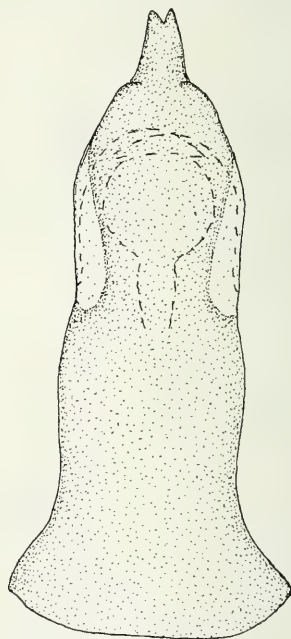
118



119



120



121

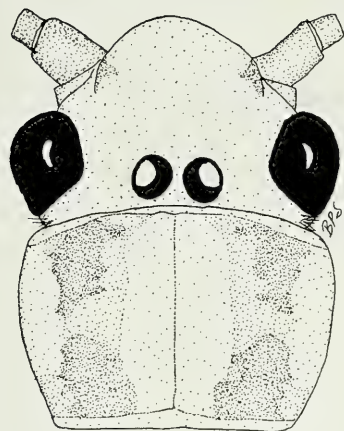
Figs 117-121. *A. muesca*, spec. nov. 117. Head and pronotum. 118. Male sternum 9. 119. Aedeagus, ventral. 120. Aedeagus, lateral. 121. Aedeagus, dorsal. Scales: 0.6 mm (117), 0.3 mm (118), 0.15 mm (119-121).

Egg. Unknown.

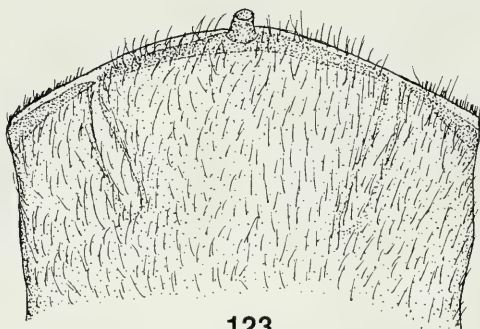
Nymph. Unknown.

Etymology. The species name, *paleta*, refers to the scoop-like aedeagal apex.

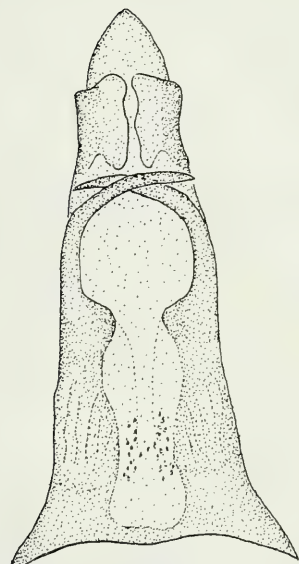
Discussion. The type locality is a tumbling cascade about 3 m wide with clear cool water (O. S. Flint, pers. comm.).



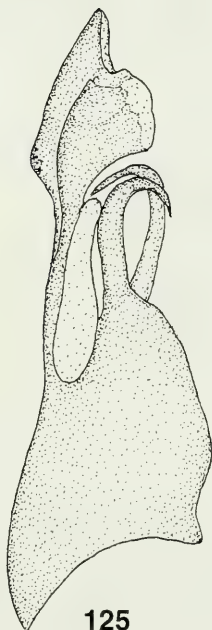
122



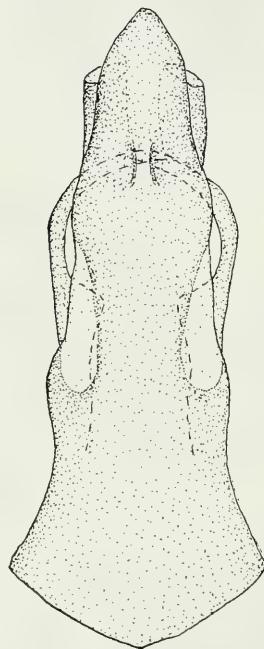
123



124



125



126

Figs 122-126. *A. paleta*, spec. nov. 122. Head and pronotum. 123. Male sternum 9. 124. Aedeagus, ventral. 125. Aedeagus, lateral. 126. Aedeagus, dorsal. Scales: 0.6 mm (122), 0.3 mm (123), 0.15 mm (124-126).

***Anacroneuria bifasciata* (Pictet)**

Figs 52, 127-134

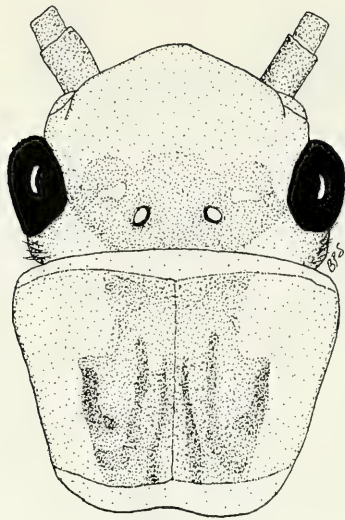
Perla bifasciata Pictet, 1841. Holotype ♀ #2672, Moritz, Colombia (MNHB).

Anacroneuria bifasciata, Zwick 1972.

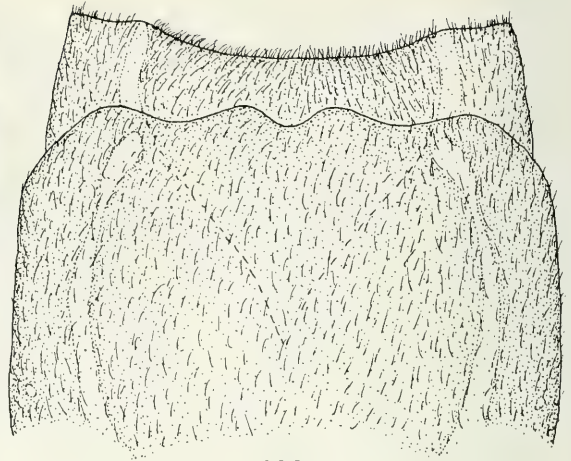
Redescription.

Adult color pattern. Head with a dark brown band between compound eyes, anterior area yellow. Median half of pronotum dark brown, pale laterally (Fig. 127). Wings banded; dark brown bands basally, at cord, and apically, separated by amber bands (Fig. 131). Antennae dark brown, cerci pale.

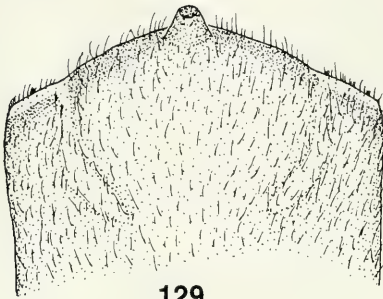
Male. Forewing length 10.5-11.5. Hammer broad basally, length greater than apical diameter (Fig. 130). Ventral aspect of aedeagal apex with a pair of small lobes forward of hooks; apex bluntly



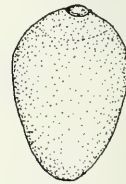
127



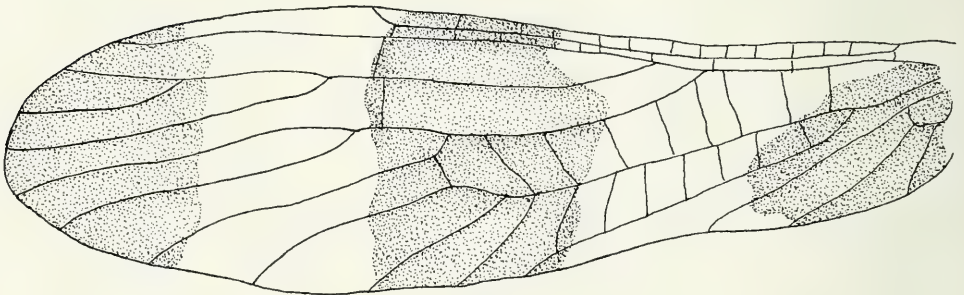
128



129



130



131

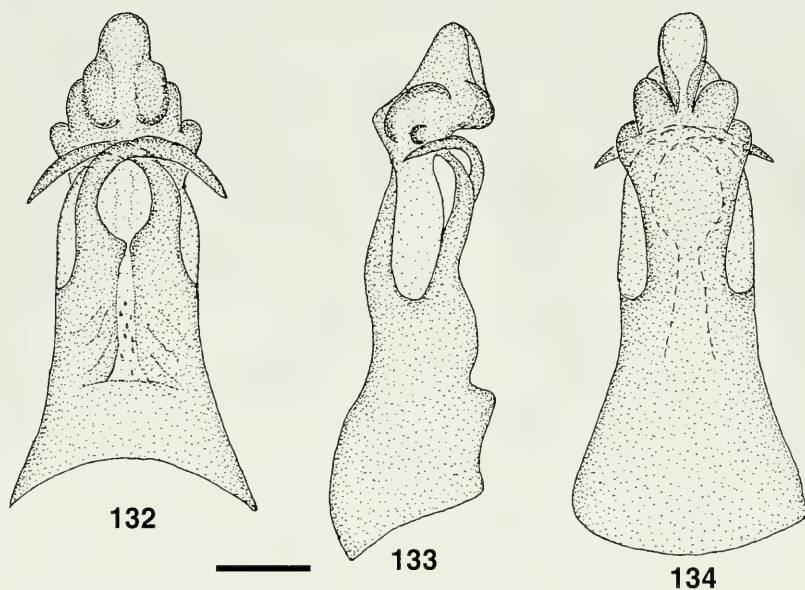
Figs 127-131. *A. bifasciata* (Pictet). 127. Head and pronotum. 128. Female sterna 8 and 9. 129. Male sternum 9. 130. Egg. 131. Left front wing. Scales: 1.2 mm (131), 0.6 mm (127), 0.3 mm (128, 129), 0.15 mm (130).

rounded with a pair of elongate, subapical lobes (Figs 52, 132). Dorsal aspect terminating in a slender mesal lobe with a pair of basal lobes (Figs 133, 134).

Female. Forewing length 14-15 mm. Subgenital plate lobes emarginate, mesal notch shallow. Mesal field of sternum 9 weakly sclerotized and covered with a patch of small, thin setae (Fig. 128).

Egg. Length 0.28 mm, width 0.2 mm. Spindle shaped with a low button-like collar. Chorion smooth (Fig. 129).

Nymph. Unknown.



Figs 132-134. *A. bifasciata* (Pictet), aedeagus. 132. Ventral. 133. Lateral. 134. Dorsal. Scale: 0.15 mm.

Material examined. Venezuela: Aragua, Rancho Grande Nat. Pk., 1100 m, 22-24 June 1984, D. S. Bogar, 1♀ (USNM). Aragua, 1 km S Rancho Grande, 5 February 1976, C. M. and O. S. Flint, 1♀ (USNM). Aragua, Rancho Grande, 1100 m, S. S. and W. D. Duckworth, 1♀ (USNM). Rancho Grande, E Aragua, 1 May 1951, F. Fernandez Yepez, 3♂♂, 2♀♀ (DZAM). Rancho Grande, 25 April 1955, F. Fernandez Yepez, C. Rosales, 1♂ (DZAM). Rio Borbureta, E. Carabobo, 300 m, 20 June 1955, F. Fernandez Yepez, C. Rosales, 1♀ (DZAM). Distrito Federal, Macizo de Naguata, Vertiente Norte, 720 m, 3 September 1959, F. Fernandez Yepez, R. Lichy, 1♀ (DZAM). Aragua Est. Exp. Caturito, 1 February 1983, O. S. Flint, 1♂ (USNM). Lara, Cerro Negro, S P. N. Yacambu, 12 November 1989, C. N. Duckett, 1♂ (USNM). Aragua, Henri Pittier N. P., 10 April 1990, C. N. Duckett, 1♀ (USNM).

Discussion. This distinctive and beautiful species was first reported from Venezuela by Zwick (1972). A male specimen from "El Pilar, Carupano, Venezuela, 1000 m" in the NHMW Vienna Museum was used as the basis for a description of the male genitalia and a single female from Maracay was also reported in the ZSM. Presently no males are known from areas other than Venezuela so it is possible that the Colombian populations might be distinct. According to Benedetto (pers. comm.) the type specimen of *Anacroneuria signata* (Walker) exhibits a similar pigment pattern but has a different type of subgenital plate. *A. bifasciata* is thought to be a mimic of a species of lycid beetle (Flint, pers. comm.).

Anacroneuria fenestrata (Pictet)

Figs 135-139

Perla fenestrata Pictet, 1841. Holotype ♂ #2697, Colombia (MNHB).

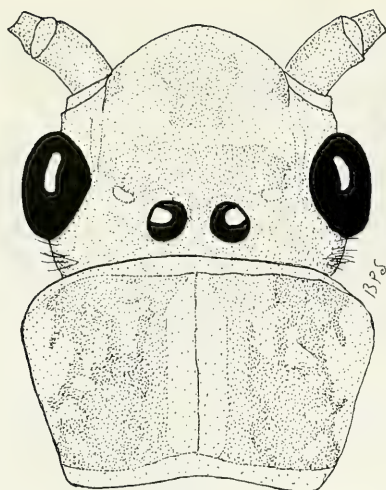
Anacroneuria fenestrata, Zwick 1972.

Redescription.

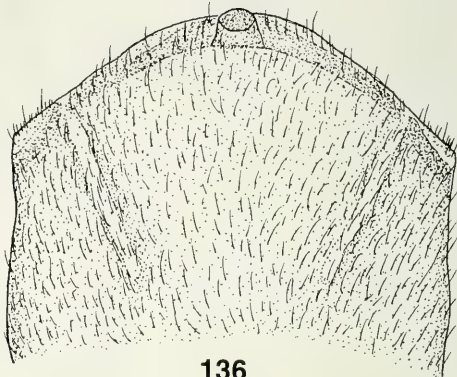
Adult color pattern. Head with a pale brown band between eyes and a pale brown blotch forward of M-line; lappets dark. Pronotum with a narrow pale median stripe and margins (Fig. 135). Wing membrane and veins brown; costal area pale.

Male. Forewing length 16 mm. Hammer short, wide and flat apically (Fig. 136). Aedeagal apex trilobed; lateral lobes small and ear-like. Dorsal aspect with a mesal keel; hooks slender (Figs 137-139).

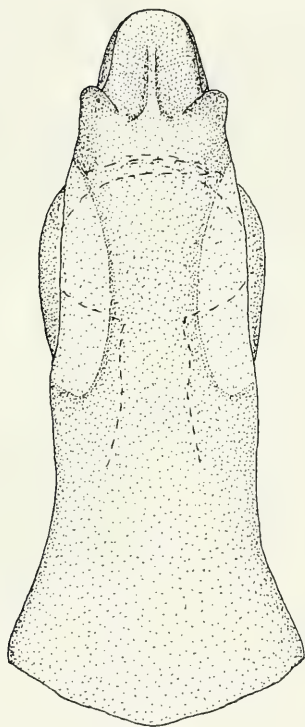
Female. Unknown.



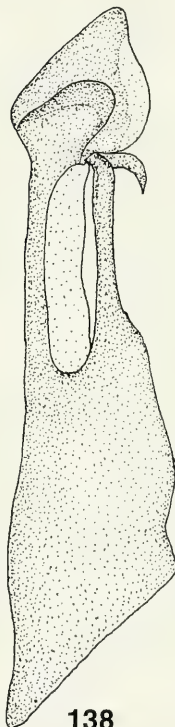
135



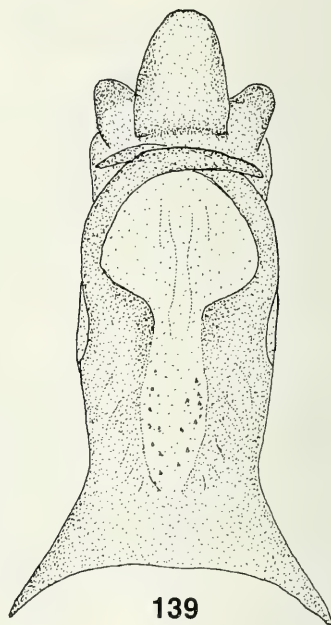
136



137



138



139

Figs 135-139. *A. fenestrata* (Pictet). 135. Head and pronotum. 136. Male sternum 9. 137. Aedeagus, dorsal. 138. Aedeagus, lateral. 139. Aedeagus, ventral. Scales: 0.6 mm (135), 0.3 mm (136), 0.15 mm (137-139).

Egg. Unknown.
Nymph. Unknown.

Material examined. Venezuela: Merida, Mucuy Fish Hatchery, 7 km E Tabay, 6600 ft, 10-13 February 1978, J. B. Heppner, 1♂ (USNM).

Discussion. The forewing length of this specimen is about twice that of the holotype (Zwick 1972), but the aedeagus appears to be the same. The two may well be distinct, but a direct comparison with the holotype is needed.

Anacroneuria intermixta (Walker)

Perla intermixta Walker, 1852. Holotype ♀, Venezuela (BMNH).

Perla intermixta, Illies 1966. Nomen oblitum.

Perla intermixta, Kimmins 1970.

I have not seen the holotype of this species, but Dr. Stephen Brooks of BMNH compared the specimen with some of my figures and generously provided notes on the type which are summarized below.

Adult color pattern. Head pale brown with an obscure brown patch over ocelli and a pair of brown rectangular patches anterolateral to ocelli. Pronotum pale brown with a median brown stripe. Wing membrane and veins pale brown.

Male. Unknown.

Female. Forewing length 29 mm. Subgenital plate bilobed, somewhat like Fig. 140, but the lobes are said to be narrower.

Egg. Unknown.

Nymph. Unknown.

Discussion. Only *A. chorrera* and *A. shamatari* of the known Venezuelan species approach *A. intermixta* in size, and both of these species have four-lobed subgenital plates. According to Kimmins (1970) the type bears the label "*Anacroneuria intermixta*" placed there in 1968 by C. G. Froehlich.

Anacroneuria signata (Walker)

Perla signata Walker, 1852. Holotype ♀, Venezuela (BMNH)

Perla signata: Kimmins, 1970.

Redescription

The following description is based on notes provided by Dr. Stephen Brooks of BMNH.

Adult color pattern. Head yellow brown, becoming paler in the anterior third. Pronotal pattern obscured by specimen condition, but with no apparent stripes. Wing membrane hyaline, but with brown bars medially and over apex. In general, similar to Fig. 131, but without basal pigment band.

Male. Unknown.

Female. Forewing length 13 mm. Subgenital plate with four lobes, similar to Fig. 146, but with the outer lobes broader.

Egg. Unknown.

Nymph. Unknown.

Discussion. This species is apparently quite similar to *A. bifasciata* in wing pattern but may not be as closely related as this similarity might suggest. Additional data on other life stages are needed to evaluate the species.

Unassociated females

Anacroneuria VZ-1

Figs 140-141

Description

Adult color pattern. Obscured by specimen condition. Head apparently pale, perhaps with a dark ocellar spot. Pronotum dark laterally, possibly with a pale median stripe. Wing membrane pale, veins pale brown except for C, Sc, and R.

Female. Forewing length 20 mm. Subgenital plate with a wide notch. Sternum 9 with a posterior sclerotized band and a mesal field covered with short thin setae (Fig. 140).

Egg. Length 0.33 mm, width 0.2 mm. Spindle shaped with a small button-like collar. Chorion smooth (Fig. 141).

Material examined. Venezuela: Merida, La Chorrera Canyon, 6500 ft, 37 km W Merida, 8 February 1978, J. B. Heppner, 1 ♀ (USNM). Merida, Rio Montalban, Rt. 4, 19 km W Merida, 20 February 1976, C. M. Flint, O. S. Flint, 2 ♀♀ (USNM). Lara, P. N. Yacambu, 11-12 November 1989, C. N. Duckett, 2 ♀♀ (BPS).

Anacroneuria VZ-2

Figs 142-143

Description

Adult color pattern. Head pale except for dark areas over ocelli and lappets. Pronotum with narrow mid-lateral dark stripes and a broad pale median stripe. Wing membrane pale, veins brown.

Female. Forewing length 18 mm. Subgenital plate with four lobes; lateral lobes larger than median lobes. Posterior margin of sternum 9 with a broad sclerotized band; median field with a trilobed setal patch; lateral setae larger and thicker than mesal setae (Fig. 142).

Egg. Length 0.38 mm, width 0.2 mm. Spindle shaped with a small button-like collar. Chorion smooth (Fig. 143).

Material examined. Venezuela: Merida, La Mucuy Cloud Forest, 2500 m, 9 July 1991, G. S. Vick, 1 ♀ (USNM).

Anacroneuria VZ-3

Fig. 144

Description

Adult color pattern. Head pale brown from ocelli forward, pronotum with a narrow mesal pale stripe and pale lateral margins. Wing membrane and veins pale brown; costal area white.

Female. Forewing length 16.5 mm. Subgenital plate with four lobes; mesal lobes separated by a wide shallow notch, lateral lobes wide. Posterior margin of sternum 9 with a wide sclerotized band; mesal field with lateral patches of thick setae; area between patches bare, or sparsely covered with short thin setae (Fig. 144).

Egg. Unknown.

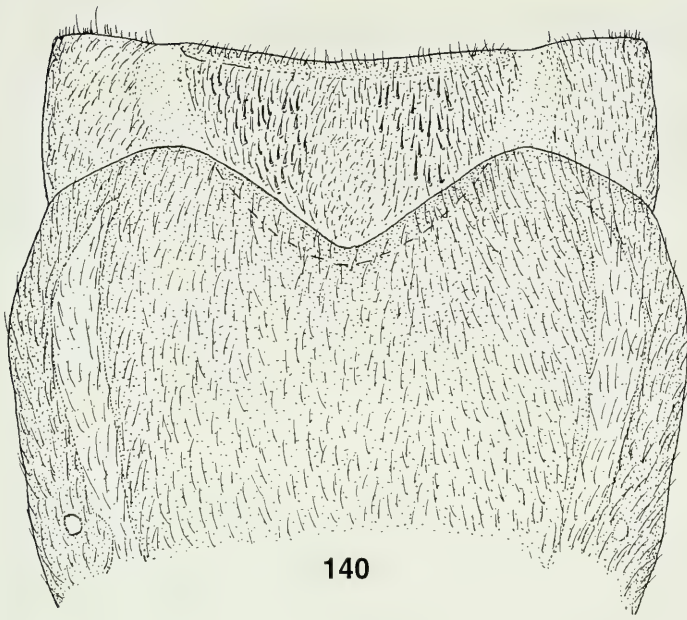
Material examined. Venezuela: Bolivar, La Escalera, 108 km S Rio Cuyuni, 11-12 February 1976, C. M. Flint, O. S. Flint, 1 ♀ (USNM).

Anacroneuria VZ-4

Fig. 145

Description

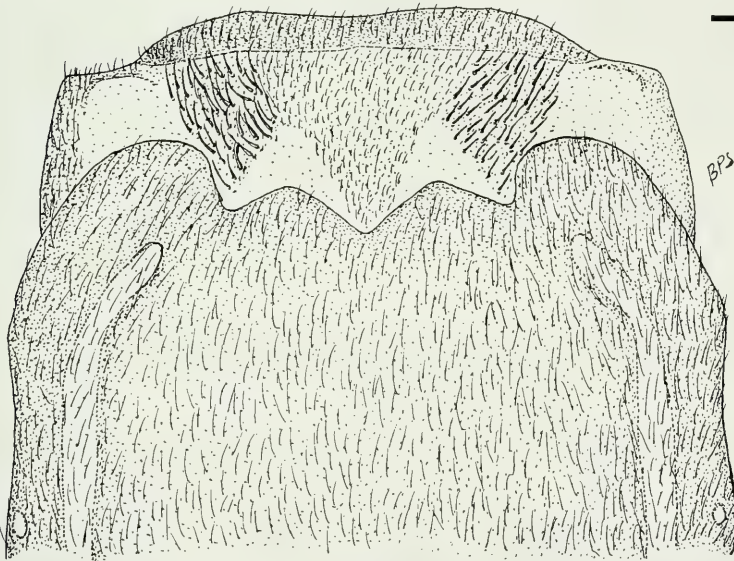
Adult color pattern. Head pale, pronotum with narrow dark mid-lateral stripes and a broad median pale stripe. Wing membrane and veins pale except Rs, Cu and cord which are darker.



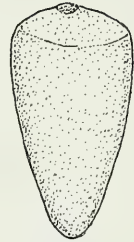
140



141



142



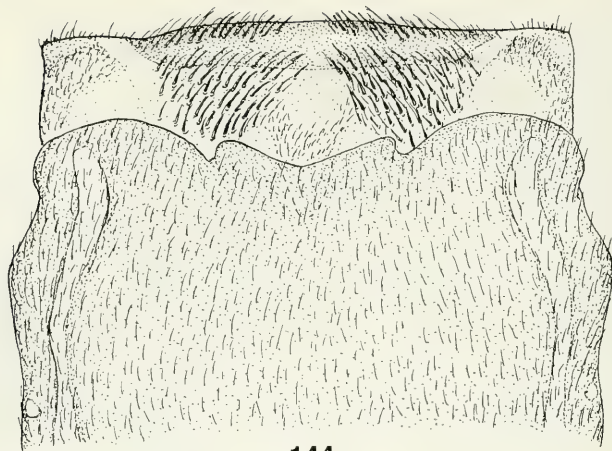
143

Figs 140-143. *Anacroneuria* structures. 140. VZ-1 female sterna 8 and 9. 141. VZ-1 egg. 142. VZ-2 female sterna 8 and 9. 143. VZ-2 egg. Scales: 0.3 mm (140, 142), 0.15 mm (141, 143).

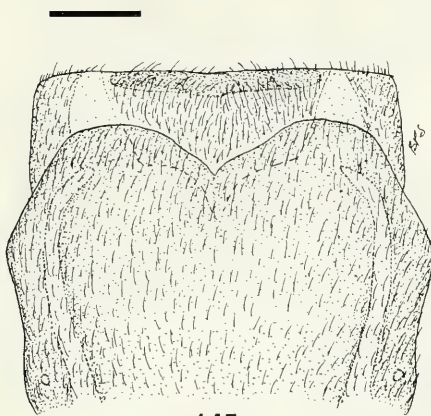
Female. Forewing length 13 mm. Subgenital plate with a wide acute notch separating the lobes. Posterior margin of sternum 9 with a sclerotized band; median field covered by a patch of thin setae (Fig. 145).

Egg. Unknown.

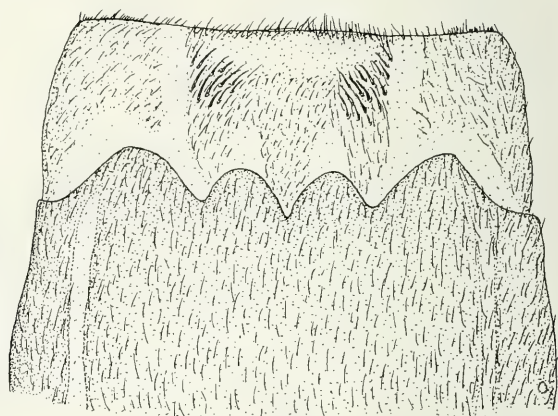
Material examined. Venezuela: Lara, P. N. Yacambu, 11-12. November 1989, C. N. Duckett, 1 ♀ (BPS). Zulia, El Tucuco, 45 km SW Machiques, 5-6 June 1976, A. Menke, D. Vincent, 1 ♀ (USNM).



144



145



146

Figs 144-146. *Anacroneuria* structures. 144. VZ-3 female sterna 8 and 9. 145. VZ-4 female sterna 8 and 9. 146. VZ-5 female sterna 8 and 9. Scale: 0.3 mm.

Anacroneuria VZ-5

Fig. 146

Description

Adult color pattern. Obscured by specimen condition. Wing membrane pale, veins brown.

Female. Forewing length 13.5 mm. Subgenital plate with four subequal lobes. Posterior margin of sternum 9 without sclerotized band; area forward of margin bare; a few thick setae in lateral patches (Fig. 146).

Egg. Unknown.

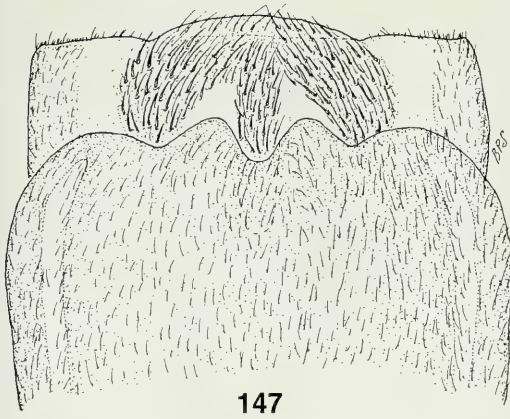
Material examined. Venezuela: Merida, El Vigia, 2 June 1976, A. Menke, D. Vincent, 4♀♀ (USNM).

Anacroneuria VZ-6

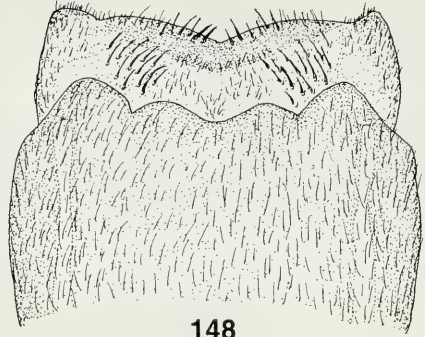
Fig. 147

Description

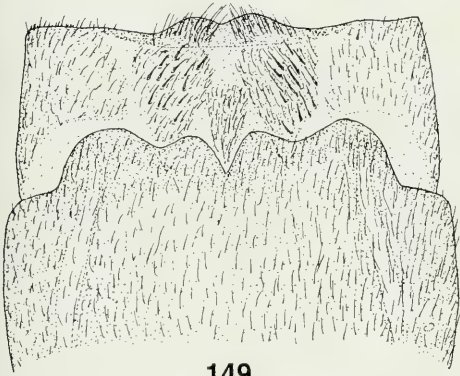
Adult color pattern. Head yellow brown, pronotum with narrow pale median stripe. Wing membrane and veins brown.



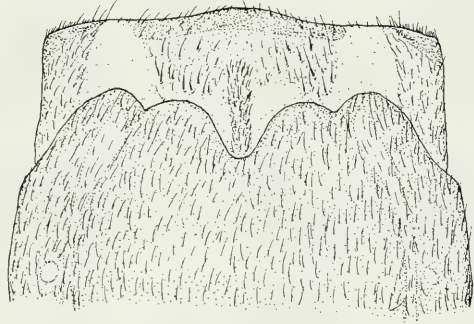
147



148



149



150

Figs 147-150. *Anacroneuria* structures. 147. VZ-6 female sterna 8 and 9. 148. VZ-7 female sterna 8 and 9. 149. VZ-8 female sterna 8 and 9. 150. VZ-9 female sterna 8 and 9. Scale: 0.3 mm.

Female. Forewing length 12-13 mm. Subgenital plate with four lobes; median lobes separated by moderate rounded notch, lateral notches shallow, lobes wide. Posterior margin of sternum 9 without sclerotized band; median field covered with a tri-lobed patch of thick red-brown setae (Fig. 147).

Egg. Unknown.

Material examined. Venezuela: Territorio Federal Amazonas, Cerro de la Neblina, Aqua Blanca, 20-21 March 1984, O. Flint, J. Louton, 3♀ (USNM).

Anacroneuria VZ-7

Fig. 148

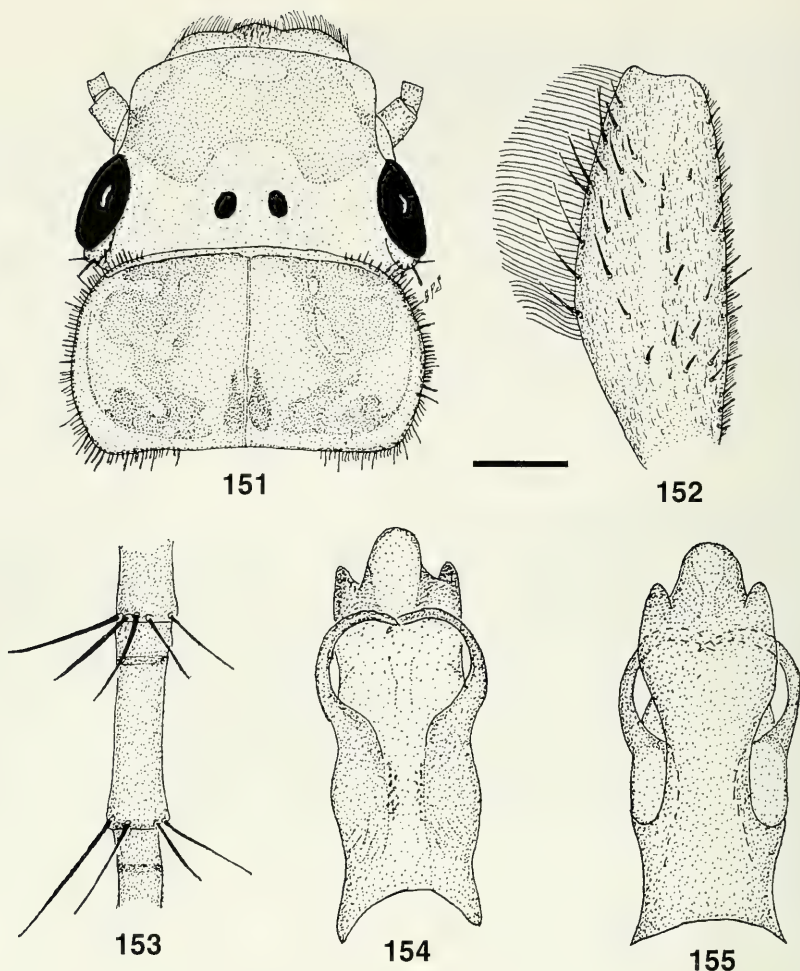
Description

Adult color pattern. Head with a dark band between eyes, yellow forward. Pronotum with narrow pale median stripe. Wing membrane and veins brown.

Female. Forewing length 10 mm. Subgenital plate with four lobes; lateral lobes project beyond mesal lobes. Posterior margin of sternum 9 with a broad sclerotized band. Lateral patches include thick setae, mesal patch sparse (Fig. 148).

Egg. Unknown.

Material examined. Venezuela: Territorio Federal Amazonas, 29 km S Rio Aqua Blanca, 17 November 1987, P. J. Spangler, R. Faitoute, 2♀ (USNM).



Figs 151-155. *Anacroneuria* VZ-10 structures. 151. Nymphal head and pronotum. 152. Nymphal left fore femur. 153. Apical nymphal cerci. 154. Aedeagus, ventral (dissected from nymph). 155. Aedeagus, dorsal. Scales: 0.6 mm (151), 0.3 mm (152), 0.15 mm (153-155).

Anacroneuria VZ-8

Fig. 149

Description

Adult color pattern. Head dark brown laterally, yellow mesally. Pronotum with narrow pale median stripe. Wing membrane and veins brown.

Female. Forewing length 11 mm. Subgenital plate broadly 4-lobed; lateral notches shallow, median notch acute. Posterior margin of sternum 9 with sclerotized band; lateral setal patches with mixed fine and thick setae, median patch sparse (Fig. 149).

Egg. Unknown.

Material examined. Venezuela: Zulia, El Tucuco, 45 km SW Machiques, 5-6 June 1976, A. Menke, D. Vincent, 1♀ (USNM).

Anacroneuria VZ-9

Fig. 150

Description

Adult color pattern. Obscured by specimen condition. Wing membrane and veins pale brown.

Female. Forewing length 11 mm. Subgenital plate with four lobes. Lateral notches shallow, median notch deep and U-shaped. Posterior margin of sternum 9 with a sclerotized band. Setal patches sparse laterally, median patch narrow (Fig. 150).

Egg. Length 0.31 mm, width 0.16 mm. Spindle shaped; collar button-like, chorion smooth.

Material examined. Venezuela: Sucre, Carupana, 25 June 1968, J. Maldonado C., 1 ♀ (USNM).

Uassociated nymphs

Anacroneuria VZ-10

Figs 151-155

Description

Nymph. Body length 8-9 mm. Head with a dark transverse pigment band between antennal bases; band with a broad U-shaped notch forward of ocelli. Mesal pronotal area pale, mid-lateral area with irregular longitudinal bands of dark pigment (Fig.151). Fore femur with about 17 scattered bristles; most bristles long. Basal bristle patch and transverse bristle row absent (Fig. 152). Apical cercal segments bear whorls of long bristles; fringe absent (Fig. 153). Gill trunks long with few branches.

Material examined. Venezuela: Territorio Federal Amazonas, Cerro de la Neblina, Camp XI, 1450 m, 25-28 February 1985, P. J. Spangler, P. M. Spangler, R. Faitoute, W. Steiner, 11 nymphs (USNM).

Discussion. The aedeagus dissected from a male nymph (Figs 154-155) does not match other Neblina species.

Acknowledgements

I thank O. S. Flint, Jr. (United States National Museum) and R. L. Brown (Mississippi State University) for the loan of specimens. I also thank P. Zwick, L. Benedetto and S. Brooks for sharing notes on types. O. S. Flint, Jr. and B. C. Kondratieff made helpful comments on an early draft of this manuscript, and O. S. Flint, Jr. generously provided field notes from his collecting in Venezuela.

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